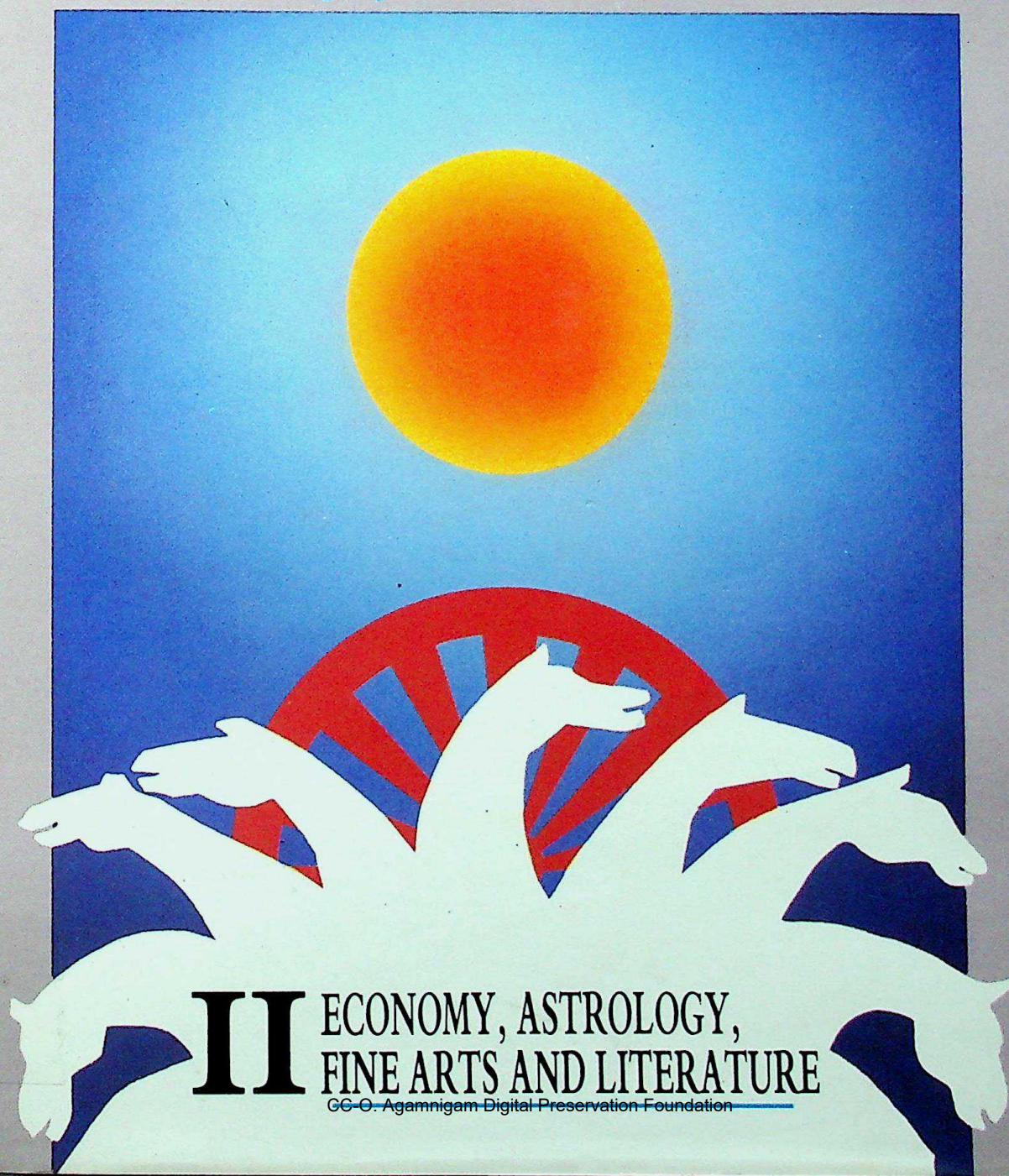


Gandhi Memorial College of Education Bantalab Jammu

ANCIENT INDIAN HERITAGE

VARĀHAMIHIRA'S INDIA

Ajay Mitra Shastri



II ECONOMY, ASTROLOGY,
FINE ARTS AND LITERATURE

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Though the great worth of old texts as a source of cultural history is widely acknowledged, astrological writings are generally supposed to be deficient in this respect. The erroneousness of the notion will be best illustrated by a glance at the present work dwelling from this angle upon the priceless historical data enshrined in the treatises of Varāhamihira, one of the most celebrated astronomers-astrologers that India is justly proud of. His writings afford precious information on practically every aspect of life one can think of and happen to contain the earliest extant datable treatment of several topics in the absence of earlier texts dealing with them which were eclipsed by the comprehensiveness of his works. The present book takes a critical view of all the information afforded by them objectively in a historical perspective, checking, corroborating and supplementing it from contemporary literary and archaeological sources and highlighting the antecedents and subsequent ramifications in many a case where found imperative. The topics dealt with include, *inter alia*, historical geography, iconography, idol worship. Indra's festival and other religious rituals and practices, varieties of necklaces, perfumery and other items of toilet and personal adornment comprehending hair-dyes, tooth-sticks, umbrellas, chowries and betel-chewing, agricultural and horticultural practices, gem industry and trade, role of astrology in everyday life, civil and religious architecture, plasters, sculpture, iconometry, earlier literature on a variety of topics much of which is now known only from Varāhamihira's works, genesis of the name Varāhamihira, jovian cycles of twelve and sixty years, meteorology and rainfall, and location of 'sub-soil water-resources. Thus, this happens to be perhaps the only work presenting critically at one place so much information on so many diverse topics of interest to students of geography, religious history, cosmetics, jewel industry and trade, agriculture and horticulture, civil and religious architecture, meteorology and hydrology.

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Ajay Mitra Shastri

G.M. College of Education
Raipur, Bantalab
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Contents

<i>List of Illustrations</i>	<i>vii</i>
<i>Abbreviations</i>	<i>xi</i>
Chapter 5 : Economy	267
Section I : Agriculture, Arbori-Horticulture and Flora	268
Section II : Fauna	294
Section III : Arts and Crafts	300
Section IV : Trade	307
Section V : Jewel Industry	312
Section VI : Weights and Measurements	324
Section VII : Coinage	329
Notes and References	331
Chapter 6 : Astrology in Everyday Life	356
Sāmvatsara	356
Beliefs appertaining Planetary Movements and Eclipses	358
Ketus	361
Canopus	362
Sandhyā	362
Earthquake	363
Utpātas	364
Aṅgavidyā	366
Signs of Men and Women	367
Five Great Men	368
Attendants of Great Men	370
Wearing New Clothes	371
Śākunas	372
Agni-lakṣaṇa	374
Notes and References	374

Chapter 7 : Architecture and Fine Arts	379
Section I : Residential Architecture	379
Section II : Temple Architecture	394
Section III : Sculpture, Music, Painting	403
Notes and References	412
Chapter 8 : Learning and Literature	429
Jyotiṣa	430
Earlier Writers and Works	438
Architecture and Sculpture	453
Daṇḍanīti	455
Erotics	456
Philosophy	456
Religion	457
Palmistry	457
Metrics	458
Notes and References	459
Appendices	
Appendix I : Genesis of Varāhamira's Name	469
Appendix II : Polity and Government	477
Appendix III : Jovian' Cycles of Twelve and Sixty Years	488
Appendix IV : Rainfall in Ancient India Textual Evidence	495
Appendix V : Dakargala or The Art of Exploring Underground Water-Veins	509
<i>Select Bibliography</i>	515
<i>Index</i>	531

List of Illustrations

- Fig.1. Indra with an indistinct object, probably *vajra* in the right hand, horizontally placed third eye and the elephant mount, Paharpur. After K. N. Dikshit, *Excavations at Paharpur*, MASI, No. 55, PL XXVII (d).
- Fig.2. Varuṇa, holding a noose and riding a swan, Harihara Temple, no. 1. Osian, Rajasthan. After Devendra Handa, *Osian: History, Archaeology, Art and Architecture*, Delhi, 1984, Pl. 112.
- Fig.3. Varuṇa holding a looped noose by its end in right hand, Rajarani Temple, Bhuvaneshwar. Courtesy American Institute of Indian Studies, Varanasi.
- Fig.4. Four-faced Brahmā Holding a *kamaṇḍalu* by his left hand, Mandhal, Nagpur District. Courtesy Deptt. of Ancient Indian History, Culture and Archaeology, Nagpur University.
- Fig.5. Four-armed Viṣṇu holding conchshell, wheel and mace, the remaining hand being in the *śāntida-mudrā*, Mathura. Courtesy Archaeological Museum, Mathura. Photograph supplied by the American Institute of Indian Studies, Varanasi.
- Fig.6. *Ardhanārīśvara* bust, Mathura. Courtesy Archaeological Museum, Mathura.
- Fig.7. Sūrya in *udīya-veśa*, seated on a low throne, and holding lotus in the right and a dagger in the left hand *Kuṣāna* period, Mathura. After V.S. Agrawala, *Indian Art*, Varanasi, 1965, Fig. 178.
- Fig.8. Sūrya in *udīya-veśa* standing holding lotus in both hands, Gupta period, Kayatha. Courtesy late Dr. V.S. Wakankar, Ujjain.
- Fig.9. Sūrya in *udīya-veśa* standing and holding lotus in both hands, Gupta period, Bhumara. Courtesy American Institute of Indian Studies, Varanasi.
- Fig.10. Agni, Paharpur. After K.N. Dikshit, *op. cit.*, Pl. XXXII (c).
- Fig.11. Yama, standing holding a staff in his right hand and with his mount buffalo standing behind, 8th century AD. Harihara Temple no. 2, Osian. Courtesy Shri Devendra Handa, Deptt. of Ancient Indian History Culture and Archaeology, Panjab University, Chandigarh.

- Fig.12. Yama seated on a buffalo, Brahmeśvara Temple, Bhuvaneshwar. Courtesy Archaeological Survey of India.
- Fig.13. *Naravāhana* Kubera, Śuṅga period, Bharhut. After *CII*, II, Part II, Pl XXIX, BI, A 58.
- Fig.14. *Naravāhana* Kubera, Harihara Temples, no. 2, Osian. Courtesy Shri Devendra Handa.
- Fig.15. Baladeva holding *musala* and *hala* wearing *kuṇḍala* in one ear only, Mathura Art. Courtesy State Museum, Lucknow.
- Fig.16. Four-armed Baladeva holding *hala*, *gadā* and a drinking vessel and wearing *kuṇḍalas* of different designs, Paharpur. After K.N. Dikshit *op. cit.*, Pl. XXII (b)
- Fig.17. Pañcavīra panel, Kondamottu, Guntur District. Courtesy Directorate of Archaeology and Museums, Government of Andhra Pradesh, Hyderabad.
- Fig.18. Skanda holding *śakti* in the left hand and seated on a peacock, Gupta period. Courtesy Bharat Kala Bhavan, Banaras Hindu University. Photograph supplied by American Institute of Indian Studies, Varanasi.
- Fig.19. Revanta on horse-back engaged in hunting, Patna Museum. Courtesy Prof. Bhagwant Sahai, formerly Head, Deptt. of Ancient Indian History and Archaeology, Patna University.
- Fig.20. Revant a as above, Pachar, Gaya District. Courtesy Amercian Institute of Indian Studies, Varanasi.
- Fig.21. Ekānamśā panel, Mathura Art, Couresy State Museum, Lucknow.
- Fig.22. Ekānamśā panel, Ellora. After Krishna Kumar, "An Ekānamśā Relief from Ellora", *JIH*, XLIV, pp. 831-88. Pl.
- Fig.23. Pārvati observing austerities, Mandhal excavations. Courtesy Deptt. of Ancient Indian History, Culture and Archaeology, Nagpur University.
- Fig.24. Varāha holding Sun and Moon, Mathura. Courtesy Archaeological Museum, Mathura.
- Fig.25. Varāha holding Sun and Moon, Bazaklik, Central Asia. After Alice Getty. *Gaṇeśa - A Monograph on the Elephant-Headed God*, second ed., New Delhi, 1971, Fig. 4.
- Fig.26. Male figure wearing *ekāvali* and *hārāphalaka*, Ajanta Cave II. After G. Yazdani, *Ajanta*, II, Pl. XIX.
- Fig.27. *Naksatramālā* (of gold), Taxila. After *ASI, AR*, 1924-25, Pl. XI.2.
- Fig.28. Bodhisattva Padmapāṇi wearing *Yaṣṭi* Ajanta, Cave I. After G. Yazdani, *op. cit.*, I, Pl. XXIV.

- Fig.29-A. Royal umbrella (circular) with pearl-decoration, Ajanta Cave XVII. After *ibid.*, IV, Pl. XVII.
- Fig.29-B. Royal umbrella (circular) with pearl-strings hanging from it, Ajanta Cave I. After *ibid.*, I, Pl. XVIII.
- Fig.30. Square umbrella, Ajanta Cave I. After *ibid.*, I, Pl. XXIB.
- Fig.31. Lady at toilet holding a circular mirror, Ajanta Cave XVII. After *ibid.*, IV, Pl. LXIVB.
- Fig.32. Seat with *kumbha* legs, Amaravati. After C. Sivaramamurti. *Amaravati Sculptures in the Madras government Museum*, Pl. XII(2).
- Fig.33. Parts of the leg of a couch, Kaśāna Art. After *Rāṣṭrakavi Maithilīśaraṇa Gupta Abhinandana Grantha*, p. 898, Fig. 39.
- Fig.34. Sarvatobhadra house.
- Fig.35. Nandyāvarta house.
- Fig.36. Vardhamāna house.
- Fig.37. Svastika house.
- Fig.38. Rucaka house.
- Fig.39. *Ekāśṭipada* plan (square).*
- Fig.40. *Ekāśṭipada* plan (circular).*
- Fig.41. *Ekāśṭipada* plan (triangular).*
- Fig.42. *Catuḥṣaṣṭipada* plan (square).*
- Fig.43. *Catuḥṣaṣṭipada* plan (circular).*
- Fig.44. Lotus-petal-shaped sword, Amaravati. After C. Sivaramamurti, *op.cit.*, Pl. X(2).
- Fig.45. Bamboo-leaf-shaped sword, Amaravati. After C. Sivaramamurti, *ibid.*, Pl. X(1).
- Fig.46. Sword with pointed tip (*sūlāgra*), Nagarjunakonda. After *BDCRI, II*, p. 299. Fig. 27.
- Fig.47. Sword with rounded tip (*maṇḍālgra*), Amaravati. After C. Sivaramamurti, *op.cit.*, Pl.X(6).

*Adapted from Bhaṭṭotpala's
commentary on *Bṛhat-saṃhitā*.

Key to Figures 39-43

1. Śikhin, 2. Parjanya, 3. Jayanta, 4. Indra, 5. Sūrya, 6. Satya, 7. Bhṛṣa,
8. Antarikṣa, 9. Anila, 10. Pūṣan, 11. Vitatha, 12. Bṛharkṣa, 13. Yama,
14. Gandharva, 15. Bhṛṅgarāja, 16. Mṛga, 17. Pitr, 18. Dauvārika, 19. Sugriva,
20. Kusumadanta, 21. Varuṇa, 22. Asura, 23. Śoṣa, 24. Pāgriva, 25. Roga,
26. Ahi, 27. Mukhya, 28. Bhallāṭa, 29. Soma, 30. Bhujaga, 31. Aditi, 32. Diti,
33. Brahmā, 34. Aryaman, 35. Savitr, 36. Vivasvān, 37. Indra, 38. Mitra,
39. Rāgayakṣmā, 40. Pṛthvīdhara, 41. Āpavatsa, 42. Āpaḥ, 43. Sāvitra, 44. Jaya,
45. Rudra.

Abbreviations

ABORI	: <i>Annals of the Bhandarkar Oriental Research Institute, Pune.</i>
AR	: <i>Asiatic Researches.</i>
ASI, AR	: <i>Archaeological Survey of India, Annual Report.</i>
ASS	: <i>Anandashram Sanskrit Series.</i>
ASSI.	: <i>Archaeological Survey of South India.</i>
ASWI	: <i>Archaeological Survey of Western India.</i>
BDCRI	: <i>Bulletin of the Deccan College Research Institute, Pune.</i>
BJ	: <i>Bṛhajjātaka.</i>
BS	: <i>Bṛhatsamhitā.</i>
BV	: <i>Bhāratīya Vidyā, Bharatiya Vidya Bhavan, Bombay.</i>
BY	: <i>Bṛhadyātrā.</i>
CGAI	: <i>Cunningham's Geography of Ancient India.</i>
CASR	: <i>Cunningham's Archaeological Survey Reports.</i>
CCGD	: <i>J. Allan's Catalogue of the Coins of the Gupta Dynasty and of Śaśāṅka in the British Museum.</i>
CII	: <i>Corpus Inscriptionum Indicarum.</i>
CMSML*	: <i>Catalogue of Manuscripts in Tanjore Maharaja Serfoji's Sarasvati Mahal Library, Tanjore, by P.P.S. Sastri.</i>
CSMDCBUL*	: <i>Catalogue of Sanskrit Manuscripts in Desai Collection of the Bombay University Library.</i>
CSMGOML*	: <i>Catalogue of Sanskrit Manuscripts in Government Oriental Manuscripts Library, Madras.</i>
CSMGOMLM*	: <i>Catalogue of Sanskrit Manuscripts in Government Oriental Manuscripts Library, Mysore, 1922-28.</i>
CSMM*	: <i>Catalogue of Sanskrit Manuscripts in Mithila by H.P. Sastri.</i>

- CSPMBBRAS* : *Catalogue of Sanskrit and Prakrit Manuscripts in the Library of the Bombay Branch of the Royal Asiatic Society.*
- DHI : *Development of Hindu Iconography* by J.N. Banerjea.
- EI : *Epigraphia Indica.*
- HDS : P.V. Kane's *History of Dharmaśāstra.*
- HIA : S.B. Dikshit's *History of Indian Astronomy (Bhāratiya Jyotiṣa Marathi).*
- IA : *Indian Antiquary.*
- IC : *Indian Culture.*
- IHQ : *Indian Historical Quarterly.*
- JA : *Journal Asiatique.*
- JAHRs : *Journal of the Andhra Historical Research Society.*
- JAIH : *Journal of Ancient India History, Culcutta.*
- JASB : *Journal of the Asiatic Society of Bengal.*
- JBBRAS : *Journal of the Bombay Branch of the Royal Asiatic Society.*
- JBORS : *Journal of the Bihar and Orissa Research Society.*
- JDL : *Journal of the Department of Letters, Calcutta University.*
- JIH : *Journal of Indian History.*
- JISOA : *Journal of the Indian Society of Oriental Art.*
- JNSI : *Journal of the Numismatic Society of India.*
- JOI : *Journal of the Oriental Institute, Baroda.*
- JOR : *Journal of Oriental Research, Madras.*
- JRAS : *Journal of the Royal Asiatic Society of Great Britain and Ireland.*
- JRASB : *Journal of the Royal Asiatic Society of Bengal.*
- JUB : *Journal of the University of Bombay.*
- JUPHS : *Journal of the United Provinces Historical Society.*
- LJ : *Laghujātaka.*
- MASI : *Memoirs of Archaeological Survey of India.*
- NPP : *Nagari Prachārīnī Patrikā.*
- NSM* : *Notices of Sanskrit Manuscripts.*
- NS : *New Series.*

Abbreviations

xiii

<i>NSP</i>	: Nirnaya Sagar Press.
<i>PHAI</i>	: <i>Political History of Ancient India</i> by H.C. Raychaudhuri.
<i>PO</i>	: <i>Poona Orientalist</i> .
<i>SBE</i>	: <i>Sacred Books of the Erat</i> .
<i>SI</i>	: <i>Select Inscriptions</i> by D.C. Sircar.
<i>SS</i>	: <i>Samāsasamhitā</i> .
<i>TCSM*</i>	: <i>Triennial Catalogue of Sanskrit Manuscripts in the Government Oriental Manuscripts Library, Madras</i> .
<i>TY</i>	: <i>Ṭikaṇikayātrā</i> .
<i>VIJ</i>	: <i>Vishveshvaranand Indological Journal</i> .
<i>VP</i>	: <i>Vivāhapaṭala</i> .
<i>YY</i>	: <i>Yogayātrā</i>

References

Unspecified figures refer to *BS*, Roman figure to the chapter, and the English figure to the serial number of verses. Thus I.1 refers to the first verse of the first chapter of *BS*.

*Used in Ch. I only

5

Economy

Section I : Agriculture, Arbori-Horticulture and Flora	268-94
Agriculture; Crops; Botanical Classification; Agricultural Produce; Famine and Crop-failure; Superstitions.	
Arbori-Horticulture; Preparation of the Soil and Manuring; Reproduction of Plant-life ; Sowing; Cuttings; Grafting; Transplantation; Order of Plantation; Irrigation; Distance between Trees; Trees requiring Moist Soil; Plant-diseases.	
Flora: Classification; Alphabetical List of Flora.	
Section II : Fauna	294-300
Classification; Wild Animals; Domestic Animals; Birds; Reptiles; Aquatic Animals; Insects.	
Section III : Arts and Crafts	300-06
Ivory; Metal-work; Pottery; Wood-carving; Masonry; Other Occupations; Slavery and Labour.	
Section IV : Trade	307-12
Internal Trade; Means of Transportation; Caravan Trade; Guilds; Regional Products; Prices; Overseas Trade.	
Section V : Jewel Industry	312-24
Diamond; Pearl; Ruby; Emerald; Other Stones.	
Section VI : Weights and Measurements	324-28
<i>Tulā</i> ; Weights; Measurements of Capacity; Lineal Measures.	
Section VII : Coinage	329-31
Notes and References	331-55



The Gupta period is one of the most prosperous ages that India ever witnessed. The unification of a large part of the country under the Guptas and consequent peace hastened the pace of all round economic progress. Extensive agricultural operations, brisk inland and overseas trade and exploitation of mineral resources,

all contributed their share to this general opulence. Brought up at Ujjayinī, one of the prominent centres of Gupta culture, our astronomer gives us many particulars about the economic condition of the age.

I

AGRICULTURE, ARBORI-HORTICULTURE AND FLORA

A. AGRICULTURE

In spite of the enormous industrial growth which marked the period, Indian economy was mainly agricultural, as it is even now. Agriculture was the mainstay of the masses and was regarded as one of the chief connotations of *vārtā*, a general name for the science of economics (XIX.II). Agricultural operations were quite elaborate. Fields were marked off from one another by means of artificial boundary lines (XIX.8), probably raised earthen platforms or thorny fences. The plough¹ drawn by oxen (XLV.62) was employed for tilling the soil. Then seeds were sown (LII.96). A good cultivator was advised to undertake cultivating operations like sowing at an auspicious moment.² When the crop was ready,³ it was harvested and piled⁴ on the threshing floor (XXXIII.21) where it was threshed and pounded. Having been husked by a winnowing basket (*śūrpa*, XLV.62; LXVII.3), the grain was stored in a granary. Paddy appears to have been stored without being husked as at present and was consequently known as husk-corn (*tuṣa-dhānya*).⁵

We have numerous references to rivers, canals, tanks, and wells which must have been utilised for artificial irrigation. The cultivation of the soil, however, depended on rains to a great extent.⁶ Varāhamihira, therefore, makes elaborate meteorological observations which have been discussed elsewhere.⁷

Crops

Two crops were usually raised within a year and the rotation of crops was known. Thus, according to the priority or posteriority of the time of sowing, there were two main crops, *pūrvasasya* and *āparasasya*, sown early in rain and autumn respectively.⁸ They correspond to the present *Kharif* and *Rabi*. Crops derived names from their ripening and harvesting seasons also. Broadly speaking, the *pūrvasasya* chiefly consisting of paddy would be ripened in autumn and conse-

quently known as autumnal crop.⁹ The *aparasasya* mainly comprising wheat and barley would be ready in summer and termed as summer crop.¹⁰ That only these two were the main crops grown in our period is evident from the fact that while dealing with predictions regarding the growth of crops, Varāhamihira takes only summer and autumnal crops into account.¹¹

Botanical Classification

Varāhamihira also refers to a botanical classification according to which all the awned or bearded grains were styled as *śūka-dhānya* (L.30), while those growing in pods or legumes were termed *kośa-dhānya* (VIII.8) or *śamī-jāti* (VIII.10). They correspond to the modern botanical classes of mono-cotyledons and dicotyledons respectively. The category of *śūka-dhānya*, according to Caraka,¹² included numerous varieties of rice, millet, barley, wheat and similar other cereals. *Śamī-jāti*, on the other hand, comprised different varieties of pulses as green gram, black gram, black eye pea, horse gram, moth gram, chick pea, lentils, vetch-ling, peas, sešamum¹³ legumes, pigeon pea, babchi seeds, senna seeds, lablab, sword bean, linseed and cowage. Some of the pulses growing on creepers formed a separate group of their own called *vallīja* (XIII.13; XVI.24).

All land was not fit for proper growth of corn. It was, thus, recognised that a sub-soil water-vein running under a field makes the crops that have grown perish (LIII.61). Similarly, it is stated that water only four cubits below the surface of the soil prevents the seeds from sprouting and makes the grown up crops wither away (LIII.895).

AGRICULTURAL PRODUCE

Śūka-dhānya

Many crops were cultivated during our period. Varāhamihira vaguely refers to rice-producing areas¹⁴ but without specifying them. We get references to the following varieties of rice.

1. *Śālī*¹⁵ corresponding to the replanted variety now called *jaḍahan*. According to Utpala, it is the most nourishing corn (*sāra-dhānya*) mentioned by Varāhamihira (XV.24). It is harvested after a gap of two months in October-November.

2. *Kalamaśālī* (XXIX.2), a variety of rice sown in May or June and ripened

in December or January.¹⁶ It was considered to be one of the best varieties (*uttama-dhānya*, XV.5; *śobhana-dhānya*, XV.10; *dhānya-vara*, XIX.6).¹⁷

3. *Yavaka* (XXIX.3; L.30).¹⁸

4. *Sūkaraka* (XXIX.2), hog's rice. It is not mentioned in any other older or contemporary work known to me.

5. *Ṣaṣṭika* (L.30; LXXV.8), so-called because it takes sixty days for ripening. *Suśruta* (I.46.8) and *Caraka* (I.27.13) refer to several kinds of *ṣaṣṭika*. *Utpala* thinks it is "the kings' corn" (*rāja-dhānya*) mentioned in XV.12 (*rāj-opayogi yad dhānyam ṣaṣṭik-ādi*). *Yuan Chwang*¹⁹ refers to a kind of rice grown in *Pāriyātra* (Bairat) that was ready for cutting in sixty days' time. It is now known as *saṇṭhā*.

6. *Raktaśāli* (XXIX.2), red rice, probably *oryza sativa*.²⁰ It occupies the first place in the *Caraka* and *Suśruta* list of *śūkadhānyas* and is regarded as the best variety of rice.²¹

7. *Pāṇḍūka* (XXIX.2), yellowish rice.²²

8. *Gauraśāli* (YY, VII.4), white rice.²³

9. *Niṣpāva* (XVI.33; XL.5; LXXVIII.33). In two of the three references, *Utpala* takes it to mean *śāli* (XVI.33; LXXVIII.33). In the remaining case, however, he informs²⁴ us that some regarded it as synonymous with *śāli* while according to others it denotes a leguminous yield.²⁵

Rice and wheat²⁶ together with barley²⁷ formed the staple food of the people. *Kodrava*²⁸ (*Paspalum Scrobiculatum*) and *kaṅgu*²⁹ or *priyaṅgu*³⁰ (panic seeds) were also cultivated and eaten by the poor³¹ as is the case even now.

Śamīdhānya

The cultivation of a large variety of pulses was also practised the following of which are named: *mudga* (*Phaseolus Mungo*, V.75; XV.14; XXV.2; XXIX.5; XL.5), *māṣa*³² (*Phaseolus Radiatus*), *masūra*³³ (*Ervum Hirsutum*), *kulattha*³⁴ (*Dolichos uniflorus*), *kalāya*³⁵ (leguminous seed), *oṇaka*³⁶ (chick pea).

Oil-Seeds

Of the oil-seeds, *tila*³⁷ (sesamum), *sarṣapa*³⁸ (mustard seeds), and *siddhārtha*³⁹ or *sita-sarṣapa*⁴⁰ (white mustard seeds) are referred to. Minced sesamum seeds

are also noticed (LXIV.6). Sesamum seeds yielding only half the quantity of oil or no oil at all were taken to forebode great impending calamity (XLV.35).

Fibrous Plants

Among the fibrous plants mention is made of cotton,⁴¹ hemp⁴² and linseed.⁴³ Cotton and linen cloths are also referred to.

Sugar-cane

Numerous references⁴⁴ testify to the raising of sugar-cane crop on a large scale. There is a reference to sugar-cane forests (*ikṣu-vana*, XV.6) and fields specially suited to the cultivation of sugar-cane crops (*ikṣu-vāṭa*, XIX.6). References to the earth over-grown with both *śāli* paddy and sugar-cane plants⁴⁵ suggest the possibility that sugar-cane was produced in the same tracts as rice.⁴⁶

Famine and Crop-failure

In spite of so many references to the prosperity of crops⁴⁷ and the absence of any recorded instance of famine and a general scarcity of food, we have numerous notices of these calamities in our work.⁴⁸ Excessive rainfall is referred to as one of the causes of famine (VII.40; XLV.38). We learn from the Junagadh inscr. of Skandagupta of the great havoc and distress caused by the bursting of the Sudarśana lake owing to too much rainfall.

For an agricultural community depending on rain-water for irrigating its fields there could be no greater disaster than drought or insufficient rainfall.⁴⁹ It resulted in crop-failure and consequent dearth of food. It had become proverbial to speak of the greatest natural calamity in terms of twelve years' drought (III.28). Yāska, for instance, speaks of a twelve-year drought that occurred in the reign of Śāntanu.⁵⁰ The Jain tradition knows of a dreadful famine lasting for twelve years during the reign of Candragupta Maurya.⁵¹

Acute shortage of food amounting to famine might also be due to the agencies of destruction like war. We have references to the destruction and stealing of crops by enemies and robbers (XIX.8, 19).

Crops were sometimes destroyed by wild beasts and the swarms of mice, insects, locusts and birds (III.28; VIII.4). Too much rain, the absence of rain,

the mice, locusts, parrots and foreign invaders were regarded as pests to crops and termed *īti*⁵² to which we have many allusions.⁵³ The practice of employing fowlers and huntsmen for protecting crops from swarms of pests prevalent in earlier period as vouchsafed by Megasthenes,⁵⁴ it may be assumed, may have been followed in our period also. People believed that all these distresses causing famine were due to some superhuman agency and astrological phenomena.⁵⁵

Superstitions

In the present context, it will not be quite out of place to refer to some superstitious beliefs relating to agriculture mentioned in our work. A number of curious methods were practised in predicting good or bad prospects for the growth of crops. One such practice was to determine the prospects of the summer and autumnal crops from the sun's entry into *Vṛścika* and *Vṛṣa* respectively. It is elaborately described in Ch.39.⁵⁶ Varāhamihira also refers to the practice of predicting the prosperity of crops by observing the profusion of flowers and fruits on certain trees (Ch.29).

Another method of ascertaining future prospects of crops was to keep the sanctified seeds of all types in equal quantities for the whole night of the full moon of *Āṣāḍha*; such of the seeds as show an increase in weight would thrive, while those that diminish would not flourish and such as neither increase nor decrease would thrive moderately.⁵⁷

B. ARBORI-HORTICULTURE

Closely connected with agriculture is plant-culture which is elaborately dealt with in the *Vṛkṣāyurvedādhyāya* (Ch.LIV). The *Kāmasūtra* (I.3.16) regards it as one of the sixty-four subsidiary arts. Kauṭilya expects his *sītādhyakṣa* (Superintendent of Agriculture) to possess the knowledge of *vṛkṣāyurveda* or seek assistance of persons well-versed in this science.⁵⁸ The highly developed state of arbori-horticulture reflected in our work must have been preceded by experiments covering a long period of time. It is interesting to find that some of the practices recorded by our author are more or less followed by Indian peasants even to this day.

Maintenance of public parks⁵⁹ constituted one of the charitable acts called *pūrta*⁶⁰. The preservation of plant life was considered to be one of the duties

of the state. The *Śukranītisāra* (IV.4.44), for instance, enjoins upon a king to have domestic plants planted in villages and wild trees in forest. Epigraphic records furnish instances of gardens maintained by kings and high dignitaries of the state⁶¹ and the *Yogayātrā* (XVI.16)⁶² contains one such reference.

Cities and towns in our period abounded with gardens and parks (LV.8; YY, XVII.14). They contained both flower plants and fruit trees. We have references to artificial (*kṛta*) and natural (*akṛta*) gardens (LV.3). Parks were often attached to houses (LIV.3).⁶³ A park was often provided with an artificial or natural stream in the middle. 'One should', says our author, 'lay out gardens on the banks of water reservoirs, for they do not look lovely without shade on their margins'.⁶⁴ (LIV.1). Hindus had their temples in the proximity of water and orchards (LV.1-8). Parks also served as venues of religious ceremonies (XLVII.15).

Preparation of the Soil and Manuring

'A soft soil', it is stated, 'is suited to the growth of all sorts of trees. One should sow thereon sesamum which must be crushed when in bloom. This is the first act in the preparation of the soil' (LIV.2). Besides this form of green manuring even now current in some parts of India, a number of substances and preparations possessing manuring properties are mentioned. Thus cows' (vv, 5, 7, 19), buffaloes' (30), goats' and sheeps' dung (17), clarified butter (7, 15, 19, 24), *uśīra* (7), sesamum (7,16, 17, 21,25), honey (7, 24), *viḍaṅga* (7, 15), milk and milk-water (7, 15, 16, 19, 20, 23), mud (5,15,25), horse-gram (16), black gram (16, 21, 25), green gram (16), barley (16, 25), groats (17, 21), rice (21), roots of certain plants (22), ashes (24), paste or oil of alangium (27, 29) and cordia (27), fruits, stale meat (21), beef (17) and marrow of hog (20) in various combinations were used as manure. The flesh of hog and deer (19) and turmeric powder (21) were employed for fumigation. The use of fish-water for irrigating certain trees was also in vogue (25, 26). The *Agni-purāṇa* recommends fish-washing for mangoes. It is still practised by mango-growers in certain parts of Bengal.⁶⁵ The ground soaked with hail-water was considered to be especially favourable for the growth of plants.⁶⁶

Reproduction of Plant-life

I. *Sowing*. Sowing is the simplest method of the propagation of plants. Varāhamihira elaborates the general process of sowing seeds, according to which

the seeds were to be taken up in the palm greased with clarified butter and thrown into milk. On the next day, the seeds were taken out of milk with greased fingers and the mass was separated into individual seeds. This process was repeated for ten successive days.⁶⁷ Then the seeds were rubbed with cow-dung several times and fumigated with the flesh of hog and deer; mixed with flesh and hog's marrow, they were to be sown in the prepared soil, and sprinkled with a mixture of milk and water (LIV.19-21).

According to another method, the seeds were steeped hundred times in the paste or oil of either alangium or cordia fruit and planted in the earth soaked with hail-water (LIV.27-28). Special methods were followed for making certain seeds with very hard shells sprout. We get the process of sowing the tamarind, wood-apple and cordia seeds.

(a) *Tamarind* (LIV.21). The tamarind seeds sprout and give out luxuriant stems and foliage when they are soaked in a compound of powdered rice, black gram, sesame, groats and stale flesh and then fumigated with turmeric.

(b) *Wood-apple* (LIV.22-26). The following method is recommended for making the wood-apple seeds sprout: Boil the roots of *āsphota*, *āmalaka*, *dhava*, *vāsikā*, *vetasa*, *sūryavallī*, *śyāmā* and *atimuktaka* in milk, cool it, and soak the wood-apple seeds in the compound for a period of time needed for hundred rhythmic claps with the palms. Then take out the seed, dry it in the sun. This process should be continued for one month. Next, dig a circular pit 1'6" in diameter and twice as deep (3 ft.); fill it up with a mixture of milk and water, dry and burn it with fire, and smear it with honey, *ghee* and ashes mixed together. Then fill it with mud to the height of 3" and then with the powder of black gram, sesame and barley and then over it put mud to the same height, and then once again fill it with the aforesaid powder, add to it an infusion of fish-water and then beat all this until it becomes a thick mass. Sow the seed at a depth of 3" and irrigate it with fish-water and flesh-water. It is stated that if this method is followed, soon a bough with charming foliage covers the canopy in an astonishing manner.

(c) *Cordia* (LIV.29-30). Having been separated from their shell and steeped in water mixed with the paste of alangium fruits and dried up in the shade seven times, the cordia seeds were repeatedly rubbed with buffalo's dung wherein they were kept for some time and thereafter sown in the mud soaked with hail-water.

II. *Cuttings*. The method of propagation by cuttings was also known and appears to have been widely practised. The following trees were propagated by means of cuttings (*kāṇḍaropya*) greased with cowdung: jack tree, *aśoka*, plantain, rose-apple, lemon, pomegranate, grape vine, *pālīvata*, *bijapūra* and jasmine (LIV.4-5).

III. *Grafting*. The question whether the art of grafting was known to ancient Indians has formed a subject of controversy among scholars. G.P. Majumdar⁶⁸ and R. Gangopadhyaya⁶⁹ hold that the method of propagation by grafting was known to India from time immemorial. P.K. Gode, on the other hand, opines that it was unknown in India before the advent of the Portuguese on Indian soil in *cir.*1498. According to him, it was used for the first time on Indian mango trees by Jesuits of Goa about AD 1550.⁷⁰ The evidence of our work which forms the sole basis of all these discussions is, however, very clear on this point. Varāhamihira regards the method of propagation by grafting as superior to that by cuttings. Two methods of grafting are recorded: (1) inserting the cutting of a plant into the root of another cut off from its trunk, or (2) inserting the cutting of a tree into the stem of another, the junction of the two in both the cases being covered with a coating of mud, (*mūl-occhede=thavā skandhe ropanīyāḥ param tataḥ*, LIV.5). It is, thus, evident that grafting was known to Indian cultivators in the time of Varāhamihira. From the absence of references in later literature, Gode doubts Indians' knowledge of grafting prior to its application by Jesuits in the middle of the 16th century AD. However, the gloss of Utpala, who flourished in the first half of the 9th century, clearly shows that grafting was practised in his time also.⁷¹

IV. *Transplantation (saṅkrāmaṇa-viropaṇa)*. The plants meant for transplantation at a distant place were smeared from root up to the stem with a mixture of *ghee*, andropogon, sesame, honey, *viḍaṅga*, cow's milk and cow-dung (LIV.7). The history of the art of transplantation in India goes back to a very hoary antiquity. Aśoka had medicinal herbs, roots and fruits imported and transplanted wherever they were not found.⁷² Varāhamihira advises cultivators to plant the trees with undeveloped branches in the dewy season (Jan.-March); those with branches, in winter (Nov.-January); and those with well-developed stems in the beginning of the rainy season. According to another reading, trees having branches were to be planted at the commencement of the monsoon, while those with well-grown stems in the middle of the rainy season. Proper care was taken to maintain the particular direction of the cut off tree in transplanting also (LIV.6). The fact

that the transplanted cutting of a tree or a seed sown in the soil does not change its nature, except for those slight differences that may be due to the influence of the soil, is recorded in LXXIV.2.

Order of Plantation

While laying out a garden, whether public or attached to a homestead, first were planted auspicious trees like *ariṣṭa*, *aśoka*, *punnāga*, *śirīṣa* and *priyaṅgu* (LIV.3). It was with a view to improve the aesthetic and hygienic surroundings of the homestead that gardens were attached to houses. Thus, *plakṣa*, *vaṭa*, *udumbara* and *aśvattha* to the south, west, north and east respectively of a house were believed to have untoward effects, whereas the presence of the same trees in the north, east, south and west in order was approved (LII.83). The presence of thorny, milky and fruit trees near a house was supposed to bring various calamities to its master. Such trees were, at the first instance, to be cut off or otherwise, other auspicious plants, to wit, *punnāga*, *aśoka*, *ariṣṭa*, *bakula*, *panasa*, *śamī* and *śāla* were planted between them (LII.84-5).⁷³ The *Śukranīti* lays down that plants yielding good flowers should be planted near villages and a garden to the left of a dwelling house (IV.4.49-50).

Irrigation

The trees thus planted were to be watered twice, in morning and evening, in summer, on alternate days in winter, and whenever the soil be dry during the rains (LIV.9). The *Śukranīti* (IV.4.50), which contains a similar direction, adds that in spring plants should be irrigated in the fifth part of the day, and never in the rainy season. Earthen pitchers were used in irrigating plants (LVIII.2). From Kālidāsa's reference to *secana-ghaṭa*⁷⁴ it appears that there were special jars for this purpose.

Distance Between Trees

As to the space to be left between two trees, we are told that it is the best if they are planted 30' apart from each other, middling, if 24 ft. apart, the least distance being 18 ft.; for, it is stated, the trees growing closeby and touching one another with their roots interlocked do not yield a good quantity of fruits (LIV.12-13). The *Śukranīti* (IV.4.44-5), however, advises the peasants to plant the

best trees at a distance of 30 ft.; those of middling quality, 22½ ft.; ordinary ones, 15 ft. and inferior ones, 7½' apart.

Trees Requiring Moist Soil (Anūpaja)

It is stated that sixteen plants, viz., *jambū*, *netasa*, *Vānīra*, *kadamba*, *udumbara*, *arjuna*, *bijapūraka*, grape vine, lemon, pomegranate, *vañjula*, *naktamāla*, *tilaka*, jack tree, *timira* and *āmrātaka* require rather moist soil for their proper growth (LIV.10-11).

Plant-diseases

The paleness of leaves, arrested growth of sprouts, saplessness of branches, and oozing out of sap, these are the diseases of plants due to the agency of cold, wind and heat.⁷⁵ According to Kāśyapa, cited by Utpala, absence of branches, stems, foliage, fruits and shade, sereness, and the waning lustre of leaves are the ailments of trees which are caused by cold, heat, rain, wind, and by trees growing too close to one another resulting in their roots being intertwined, and by elephants rubbing their temples against the tree.⁷⁶ For healing the plant, its defective part was first trimmed off with a knife, it was smeared with a compound of *ghee* and mud and sprinkled with milk and water (LIV.15). In the event of a tree losing its power of bearing fruits, it was sprinkled with milk cooled down after being boiled with horse-gram, black gram, green gram, sesame and barley (LIV.16).

According to another method followed for an exuberent yield of flowers and fruits in a tree, it was sprinkled with a mixture of two *āḍhakas* of the powdered dung of sheep and goats, one *āḍhaka* of sesame, a *prastha* of groats, a *droṇa* of water, and one *tulā* of beef kept together for seven nights (LIV.17-18). This manuring device is also mentioned in the *Śukranīti* (IV.4.53), but without specifying the quantity of ingredients. It also emphasises the role of flesh and fish-washing in the nurture of plants (IV.4.45, 52).⁷⁷

C. FLORA

The growth of population and its settlement over a large part of the country has deprived India of much of her vegetation. But a student of Varāhamihira's works is bound to be deeply impressed with her enormous floral wealth in former

times. We have references to forests both of natural (*vana*,⁷⁸ *kānana*⁷⁹) and cultivated (e.g. *sālikṣuvānāni*, XV.6) sorts.

Classification

Varāhamihira seems to follow the broadest classification of plant life into (1) trees (*taru*, *ṛkṣa*, *druma*, *pādapa*), (2) succulent shrubs (*gulma*), and (3) creepers (*latā*, *vallī*) in general.⁸⁰ Utpala rightly explains *gulma* as a tree without trunk (*gulma akāṇḍa-viṭapa ity=arthah*, XL.7) or a collection of tendrils with only one single root (*gulma eka-mūlajo latā-samūhah*, XI.2).⁸¹ In *Caraka* (Sūtrasthāna, I.36), *Suśruta* (Sūtrasthāna, I.2.3) and *Manu* (I.46), *vanaspati* is defined as a tree that bears fruits without flowers,⁸² but in our work it is deprived of this technical sense and is synonymous with *ṛkṣa* denoting trees in general (LIV.18).⁸³ The words *latā* and *vallī* are often used for creepers in general, but sometimes a distinction seems to be intended between the two.⁸⁴ The distinction is not quite clear; *vallis* are probably creeping plants while *latās* are twining plants. They are used in this sense in the *Amarakoṣa* (*vallī tu vratatir=latā; mūlāc=cāgram gatā latā*, II.4.9, 11). The word *pratāna*, which occurs only once (XLVII.5), denotes creepers with stems spreading on the ground (procumbent or document).⁸⁵ *Oṣadhi* connotes the plants that wither away after fructification, and Cakrapāṇi, the commentator of the *Caraka*, divides the *oṣadhis* into two classes, (1) annuals or perennials bearing fruits, and (2) plants that wither away after maturing and without fructification.⁸⁶ But our author uses this word⁸⁷ in the sense of herbaceous plants possessing medicinal properties. He refers to the *oṣadhis* growing on land (*sthala-sambhav=auṣadhīnām*, XL.2) and to persons clever in their use (V.41). There is a reference to *kṣupa* (XCIII.13) which, according to *Amarakoṣa* (II.4.8), denotes a plant with minute branches and roots. The grass (*tṛṇa*) constituted a separate class by itself.⁸⁸

Varāhamihira refers to trees bearing feminine names (*strīsamjñās=taravaḥ*, XLII.14), indicating the existence of a system of classifying trees on the basis of the gender of their names. He also alludes to another classification of trees into thorny (*kaṇṭakin*),⁸⁹ fruit-bearing (*phalin*, *phaladruma*, *phalataru*),⁹⁰ flower-bearing (*puṣpadruma*)⁹¹ and those with milky sap (*kṣīrin*, LII.84; *sakṣīra*, LXXXV.17; XCIV.16; *kṣīrataru*, LII.118). Utpala says that *khadīra* etc. are thorny trees while *bijapūra* etc. are fruit-bearing. The popularity of this classification is apparent from the *Śukranītisāra* (IV.4.48-51, 58-61) which enumerates the fruit-bearing and

thorny trees, the latter to be planted in forests. The list of thorny trees there begins with *khadira* while *bijapūra* under its other name *mātulūṅga* is included among the fruit-bearing trees.

From the mention of red, yellow, white and black flowers,⁹² it appears that the flowers were classified on the basis of their colour. Blossoms with particular colours were considered sacred to particular gods.⁹³

Alphabetical List

An alphabetical list of the flora mentioned by our author is given below.⁹⁴

1. *Abhayā* (XLVII.39), also called *haritakī* (LXXV.11; LXXVI.1) and *pathyā* (LXXV.3), *Terminalia chebula*, is a herb possessing medicinal properties.

2. *Abja* (XLII.33, LXIX.2), the lotus so called because of its growing in water. For the ordinary lotus, our author employs several other names, viz., *ambuja* (XII.10; XXX.20; LVII.39, 44; LXX.13), *utpala* (LXXV.2; LXXVI.7), *pañkaja* (XXVIII.14; LVII.41), *kamala* (V.59; XXIV.14; XLII.5; LXIX.1; LXXX.8), *padma* (XXIX.10; LIII.100; LXVII.45, 92; LXIX.11), *śatapatra* (LIII.101; LXVII.23). There were several varieties of lotus (*vicitrāmbuja*, XII.11), white, red and blue ones being referred to: *sitotpala* refers to the white variety (XII.4, 9); *raktotpala*, *Nymphaea rubra* (XXIX.9) and *kahlāra*, *Ottelia alismoides* (LV.4) to the red; and *indīvara* (XII.9; XLVII.9), *nīlanīraja* (LXIX.7) and *nīlotpala* (XXI.23; XXIX.9; XXXII.21; XLII.33; XLIX.7; LXVII.66) to the blue sort. We have several references to *kumuda*, water lily (IV.30.32; VIII.33; IX.45; XII.10; XXIX.10), and *kuvalaya* (XXX.20) denotes its blue variety. According to *Utpala*, *padma* mentioned in LIII.100 refers to *sthalapadma*, *Hibiscus mutabilis*, a variety growing on land. Varāhamihira speaks of *kamalavana* (XLII.5), evidently referring to lotuses growing in continuous stretches of water over a long distance and thus presenting the appearance of a forest, a scene quite common in India even today. The opening and closure of the lotus buds at the appearance of the sun and the moon are referred to (*Dhvajam asura-sura-vadhū-mukha-kamalāvana-tuṣāra-tikṣṇāmsum*, XLII.5). There are references to the stalk (*mṛṇāla* noted for whiteness, IV.32; XI.49), pole (*kiñjalka*, XXX.20), buds (*dala*, LXIX.7) and the inside (*padma-garbha* noted for its lustre, LXIX.11; *kamalodara*, LVII.48) of the lotus. Water lilies (XII.10) and lotuses (XII.4, 9; XLVII.9) are described as growing in ponds in autumn.

3. *Agnimanthā* (XLI.39), *Aeschynomene sesban*.

4. *Ajā* (XLVII.41), a medicinal herb mixed with *puṣyasnāna* water.
5. *Ajakarṇa* (XLII.15), approved for making Indra's flagstaff.
6. *Ajamoda* (LXXV.11), *Apium graveslens*, a medicinal herb used in a digestive powder. Utpala gives *dīpyaka* as its another name.
7. *Akṣa* (XLVII.4), also called *vibhītaka* (LII.118; LIII.24-5,102), *Terminalia belerica*.
8. *Āmalaka* (LIII.121; LVI.6; LXXV.6; LXXVI.3), *Phyllanthus emblica*.
9. *Ambataru* (LXXVIII.17-18), a timber tree recommended for furniture.
10. *Āmra* (XXIX.II; LIII.119; LVIII.6), also called *cūta* (LXXXV.80), *Mangifera indica*, recommended for fashioning images (LVIII.6).
11. *Āmrātākā* (LIII.50; LIV.11), *Spondias mangifera*.
12. *Amṛtā* (XLIII.9), also called *gudūcī* (LIII.115. Cf. *Amara*, II.4.82), *Tinospora cordifolia*.
13. *Aṅguṣṭhikā*. Its flower (*aṅguṣṭhika-puṣpikā*, LIII.109 and comm.) is bluish-red (*nila-lohita*).
14. *Añjana* (LIII.50), a timber tree employed in making furniture (LXXVIII.2).
15. *Aṅkola* (LIII.50; LIV.27, 29), *Alangium Lamarkii*.
16. *Apāmārga* (LIII.115; LXXXIV.7), *Achyranthes aspera*.
17. *Aparājītā* (XLVII.39), a medicinal herb mixed with *Puṣyasnāna* water. Utpala gives *sāmī* as its other name. According to the *Amarakoṣa* (II.4.104), it was also called *Viṣṇu-krāntā* which Utpala regards as one of the herbs bearing auspicious names (*praśastanāmnyaś=c=auśadhyah*, XLVIII.42).
18. *Araṇi*, a timber tree forbidden for building purposes (LII.118).
19. *Ariṣṭa* (LII.85; LIII.105; LIV.3), *Melia azadirachta*, a timber tree recommended for fashioning images (LVIII.5).
20. *Ariṣṭikā* (XLVII.40), a medicinal herb mixed with *Puṣyasnāna* water.
21. *Arjuna* (XXIX.11; XLII.15; XLIII.4; LIII.12, 101, 105, LIV.10; LVIII.6; LXXXIV.6; XCIV.16), also called *kakubha* (XLIII.4; LIII.76, 119), *Terminalia arjuna*.

22. *Arka* (XXIX.10; XLIX.25; LXXXIV.3), *Calotropis gigantea*.
23. *Asana* (XXIX.5; LXXVIII.2, 11, 15, 17), *Terminalia tomentosa* or *Bridelia martana*.
24. *Āśmantaka* (LIII.43), *Oxalis* sp.; *Bryophyllum calycinum*.
25. *Āśoka* (LII.88; LIII.119; LIV.3), *Saraca indica*, *Jonesia Asoka*. Both of its species, *raktāśoka* (XXIX.2; XLII.42; LXXIX.6), the red *āśoka*, and *nīlāśoka* (XXIX.2), the blue *āśoka*, are noticed. The red *āśoka* flower is noted for its deep red hue and whenever no species is specified the red variety is intended (VI.13; XXXVII.2; XLII.33).
26. *Āsphota* (LIV.22), also called *sārivā* (LIII.87), *Hemidesmus indicus*.
27. *Āśvagandhā* (LXXV.9), *Withania Somnifera* Dunal.
28. *Āśvakarṇa* (XXIX.7; LIII.105; LXXXIV.7), *Shorea robusta*.
29. *Āśvattha* (XXIX.3; XLIII.12; LII.83; LXIX.3), *Ficus religiosa*, was regarded as sacred. Also called *pīppala* (LIII.96) which is the original of Hindi *pīpal*.
30. *Atasī* (X.21; LVII.32; LXXX.7), *Linum usitatissimum*, its flower being noted for dark blue colour.
31. *Atibalā* (LIII.50), *Sida rhombifolia* or *Abutilon indicum*.
32. *Atimuktaka* (LXXVI.7), *Aganosma caryophyllum*. The name is, however, more frequently used as a synonym of *syandana* or *spandana* (*Bignonia indica*), *Ougeinia Dalbergiodes*, a timber tree (XXIX.5; LIV.4, 22, cf. *Amāra*, II.4, 26) used in making images and furniture (LVIII.2, 17, 18).
33. *Badarī* (XXIX.5; LIII, 16, 17, 72, 74, 75), *Zizyphus jujube*. Its twigs were chewed as tooth-sticks (LXXXIV.5) and its fruit was called *badara* (LIII.114; LXII.2).
34. *Bakula* (LII.85; LIII.119), *Mimusops elengi*. Its flowers were regarded as particularly sacred to the Sun and Mars (CIII.47). Also called *kesara* (LVIII.6).
35. *Bāṇa* (XII.6) flowers are noted for their black shade (X.21, where Saturn is compared with it).
36. *Bandhujīva* (XXIX.8), *Pentapetes phoenicea* (*Ixora coccinea*) yields red flowers

(XI.11), and a lady with her lips as red as *bandhuḥjīva* flowers is said to be beautiful (LXIX.6). The same as *bandhūka* (XXX.15).

37. *Bhadrā* (XLVII.40). Utpala gives *balā* as another name.

38. *Bhadrādāru* (LXXXIV.7), *suradāru* (LVIII.5; LXXVIII.2), or *devadāru* (LXXVIII.15), *Cedrus libani*, variety *deodara*. It grows on the Himalayas at an elevation roughly between 8500 and 5000 feet (F.C. Ford Robertson, *Our Forests*, pp.10, 37). The exudation of *devadāru* was called *kunduruka* (LVI.2; comm. *kunduruko devadāruvṛkṣa-niryāsaḥ*).

39. *Bhallātaka* (XXIX.11; XLIII.5; LIII.50; LVI.3), *Semecarpus anacardium*.

40. *Bhāṇḍīra* (LXXXIV.6), a tree twigs whereof are recommended for use as tooth-sticks.

41. *Bhāṇḍī* (LIII.48), a herb.

42. *Bijapūra* (LIV.4, 10), *Citrus medica*.

43. *Bilva* (LIII.18, 50, 76, 105; LXXXV.80), *Aegle marmelos*, is a sacred tree whose mark on an article is considered to be auspicious (XXXIII.10; XLIX.2; LXIX.10; LXX.13; LXXVIII.21). Its figure along with that of the *pramathas* and *svastika* is recommended to be made on temple-doors (LV.15). Its twigs were used as sacrificial fuel (XLV.24) and chewed as tooth-sticks (LXXXIV.5). Its timber was fashioned into images (LVIII.5), and its fruit mixed with *Pusyasnāna* water (XLVII.42) and used in preparing the *vajraleṣa* (LVI.3,5). Also known as *śrīvṛkṣa* (XXXIII.10; XLIX.2; XLV.24; LV.15; LXIX.10; LXX.13; LXXVIII.21) and fruit as *śrīphala* (LXXXIV.3).

44. *Bimba* (LXIX.6). Varāhamihira, like other Sanskrit poets, compares female lower lip with its fruit.

45. *Brāhmī* (XLVII.41), *Herpestis Monnieria*.

46. *Brhatī* (LXXXIV.5), *Solanum indicum*. According to Utpala, it is the same as *kaṇṭakārikā* (LIII.57) or *nidigdhikā* (cf. *Amara*, II.4.93). Botanically, however, *kaṇṭakārikā* bears a different name, *Solanum jacquinii*. It is said that if *kaṇṭakārikā* is seen without thorns but with white flowers, a water-vein underneath it may be expected.

47. *Campaka* (XXIX.8; LXXVI.6, 7), *Michelia champaca*.

48. *Candana* (XLIII.9), *Santalum album*. The fragrant sandal wood is recommended for making images (LVIII.5) and furniture (LXXVIII.2, 12, 14, 18) and its paste was frequently used in toilet and cosmetic preparations in ancient India (LXXVI.9, 30). It grew abundantly in the Malaya region and was consequently called *malaya* (LXXVI.7, 8, 14, 24, Cf. *Raghuvamśa*, IV.48, 51, etc.).

49. *Chattra* (LIII.101), Fennel; Mushroom.

50. *Cirabilva* (XXIX.5), the same as *karañja* (LIII.33) and *naktamāla* (LIII.101, cf. *Amara*, II.4.47). But botanically all these three bear different names: *Holoptelia integrifolia*, *Galedupa arborea*, *Caesalpinia bonducella*. The *naktamāla* needs moist soil for proper growth (LIV.11). *Karañja* twigs are recommended as tooth-sticks (LXXXIV.4).

51. *Coca*⁹⁵ (XL.4). According to Utpala, it is the same as *pālevata* or *nālikera*, coconut (*cocam pālevatam nālikeram vā*; also on LIV.4 where he identifies *pālevata* with *coca*). But *Amara* regards it as a synonym of *vac*, now called *taja* (II.4.154).

52. *Dāḍīma* (LIV.4, 10; LXXXIV.7), *Punica granatum*, pomegranate. The red hue of the seeds of the ripe pomegranate fruit is noticed (*parīṇata-dāḍīma-gulikā-guñjā-tāmram*, LXXX.8). Also called *piṇḍāra* (LIII.50).

53. *Dantī* (XLIII.9; LIII.48), *Baliospennum axillare*.

54. *Darbha* (XXIV.8; XCIV.5), *Poa cynosuroides*, a holy grass much used in religious ceremonies. *Kuśa* flowers are mentioned in XXIX.13.

55. *Dhanvana* (LVI.1), *Grewia tiliefolia*.

56. *Dhānya* (LXXVI.13, 15) or *dhānyakāphala* (LXXX.6), *Coriandrum Sativum*, much used in cosmetic preparations in ancient India.

57. *Dhava* (XLII.15; LII.118; LIII.105), *Anogeissus latifolia*; *Conocarpus latifolia*.

58. *Drākṣā* (LIV.4) or *mṛdvīkā* (LIV.10), grape vine.

59. *Dūrvā* (XL.4; LIII.37, 47, 77, 78), *Cynodon dactylon*. Its stalk is noted for its dark green colour (*dūrvākāṇḍa-syāme*, V.58), its flower being mentioned in XXIX.13.

60. *Edikākṣī*, a variant reading in XLVII.41.

61. *Garudavegā* (LIII.87), a herbaceous plant (*vīrudh*).

62. *Girikarnikā*, *Clitorea ternata*, white variety, mentioned under the name *śvetā* (XLIII.10).

63. *Gokṣuraka* (LXXV.10), *Tribulus lanuginosus*, popularly known as *gokhru*. It possesses medical properties and was used in medicines.

64. *Guggulu* (LVI.3, 5; LXXVI.9, 11), *Balsamodendron mukul*, popularly called *gugal*.

65. *Guṇḍra* (LIII.100), *Saccharum sara*, is classed as a *tṛṇa*.

66. *Guñjā* (LXXX.8, 11, 12) or *kṛṣṇala* (LXXX.11); *Abrus prevatorius* seeds, popularly known as *ghoṅghcī*, are noted for their red colour (LXXX.8) and formed a unit of weight. At present necklaces of *guñjā* seeds are worn by tribals in North India.

67. *Haridrakataru* (LIII.45; LXXVIII.2, 16), *Curcuma longa*.

68. *Haridrā* (V.58), turmeric, noted for its deep colour. Also called *rajanī* (XLIII.9) and *kāñcanī* (XLVII.41, cf. *Amara*, II.9.41).

69. *Hastikarṇa* (XXIX.7) or *ibha* (LIII.101), *Ricinus communis*.

70. *Inguda* (XXIX.6), *Ximenia aegyptiaca*, is a wild tree commonly known as *ingua*.

71. *Indrataru* (LIII.69).

72. *Jambū* (XXIX.4; LIII.8, 9, 86, 87, 101, 119. LIV.4, 10; LXXXIV.7), *Eugenia jambolana*, is the rose-apple tree now called *jāmun*.

73. *Japā* (XXVIII.14), *Hibiscus rosasinenses*, a flower-plant called the China rose. Its blossom is noted for dark red colour.

74. *Jāti* (LXXXIV.4), *Barleria cristata*.

75. *Jivā* (XLVII.39), *Dendrobium sp.*, is a herb mixed with bath water and popularly called *ḍoḍi*. *Jīvanti*, *jīvani*, *jīvanīyā*, *madhu* and *sravā* are its other names given in the *Amarakoṣa* (II.4.142).

76. *Jivaka* (LVIII.6), commonly called *viṇayasāra*, a timber tree recommended for making statues. According to *Amara*, it is the same as *asana* noticed above (II.4.44).

77. *Iyotiṣmatī* (XLVII.39), *Cardiospermum halicacabum*, is a herbaceous plant (LIII.87).

78. *Kadalī* (XXIX.7; XL.4; XLIX.26; LIV.4), *Musa sapientum*, is the well-known plantain tree. Its trunk is noted for its bluish-yellow shade (LXXIX.8; LXXXII.1).

79. *Kadamba* (LIV.10; LXXXIV.5), *Anthocephalus kadamba*, yields flowers at the approach of rains and there is a reference to northern wind fragrant on account of its flowers (XXVII.8).

80. *Kākodumbarikā* (LIII.19), *Ficus sp.*, is commonly called *kaḍambarī*. Utpala gives *phalgu* as another name (cf. *Amara*, II.4.61).

81. *Kampillaka* (LIII.21), a tree requiring moist soil for normal growth.

82. *Kapikacchu* (LXXV.4, 9) is a twining creeper commonly known as *kavānch*. Also called *svaguptā* (XLIII.10, cf. *Amara*, II.4.86-7 for other names).

83. *Kapittha* (XXIX.12; LIII.41; LIV.22; LVI.1, 5, 7), *Feronia elephantum*, is the wood-apple tree popularly called *kaith*.

84. *Karavīra* (XLIX.7; LXXXIV.6), *Nerium odoratum*, is popularly known as *kanail*. It yields red flowers of excellent hue but without any fragrance.

85. *Karīra* (LIII.67, 74, 76), *Capparis aphylla*, called *karel* in Hindi. Its sprout and milky sap are mentioned (LIII.106).

86. *Karṇikāra* (XXIX.9) *Hibiscus mutabilis*, commonly called *kathacampā*, bears red flowers of charming hue but with no smell whatsoever. If in a moist soil it bears white flowers, it is indicative of sub-soil water (LIII.59). *Amara* gives *parivyādha* as another name for it (II.4.60).

87. *Kāśa* (LIII.100, 103), *Saccharum cylindricum*, a kind of grass known as *kās*.

88. *Kāśmarī* (XLIII.12; LXXVIII.2; LXXXIV.3), *Gmelina arborea*, is a timber tree popularly known as *khambharī*. Also called *śrīparṇī* (LIII.105. Cf. *Amara*, II.4.35-6).

89. *Kataka* nuts (*kataka-phala*) along with other articles were used for purifying water (LIII.121).

90. *Kaṭambharā* (XLIII.10), is a herb, its another name, according to Utpala, being *mahāśvetā*. But *Amara* (II.4, 110, 153) distinguishes them from one another.

91. *Khadira* (XXVI.9; XXIX.11; XLIII.12; LVIII.5,6; LXXXIV.5; LXXXV.80), *Acecia catechu*.

92. *Kharjūra* (LIII.101) or *kharjūrī* (LIII.58), *Phoenix sylvestris*, is the date tree (*khajūr*). It is one of the palmaceae classed as tree-grasses (*tṛṇa-druma*) by Amara (II.4.270). Varāhamihira refers to a *kharjūra* tree with two tops (*dvi-śiraska*, LIII.58), which is an exception.

93. *Kīcaka* (LXXXV.80), a species of bamboo. According to Amara, those bamboos which produce noise when moved by the wind are called *kīcaka* (*veṇavaḥ kīcakās=te syur=ye svananty=anil-oddhatāḥ*, II.4.161).⁹⁵

94. *Kimśuka* (VI.13; XXIV.14) or *palāśa* (XXIX.6; XXX.7; XLIII.12; LIII.17, 59, 83, 96, 112; XCII.4), *Butea frondosa*, yields red flowers of excellent hue but devoid of any smell. This tree profusely grows in Madhya Pradesh and in parts of Uttar Pradesh. A *palāśa* tree with white flowers, which form an exception, indicates the presence of a water-vein nearby (LIII.59).

95. *Kovidāra* (XXIX.13; LIII.27), *Bauhinia species*, popularly called *kachnār*, blooms in autumn.

96. *Kṣemā* (XLVII.41), *Augelica glauca*. Utpala gives *kāṣṭhaguggula* as its synonym and says that it was popularly known as *coraka* which is the original of its modern name *cora*. It was also known as *cola* and used in cosmetic preparations (LXXVI.14).

97. *Kṣemataru* (LXXXIV.3).

98. *Kṣīrikā* (XXIX.2), *Ficus sp.*, is the same as that called *khiranī* in Hindi. Utpala identifies it with *dugdhikā*, *Euphorbia species*, popularly called *dūdhi*. Amara (II.4.45) gives *rājādana* and *phalādhyakṣa* as other names of *kṣīrikā* and distinguishes it from *dugdhikā* (II.4.100).

99. *Kunda* (XXIX.5), a jasminum species. The *kunda* flowers are specially noted for their white hue (*avadāta*, IV.30; VIII.53). Beautiful are indeed the teeth resembling the *kunda* buds (LXIX.6).

100. *Kuṅkuma* (X.11; XLI.10; XLIX.21), *Crocus sativa*, is saffron. It was used as a dyeing stuff and a thread coloured with it (*pratisara*, XLIII.5; XLVII.33) was and is still used in religious ceremonies.

101. *Kurabaka* (XXIX.8), *Barleria cristata*, red variety (cf. *Amara*, II.4.74).
102. *Kuraṇṭaka* (XLII.33), *Barleria prionites*, is according to *Amara*, a yellow variety of the above (*tatra pīte kuraṇṭakah*).
103. *Kuṣṭha* (XLI.9; LXXVI.5, 6, 7, 32) or *utpala* (LXXVI.10), *Costus speciosus*, is the fragrant herb called *kuth*. It was much used in preparing perfumes and formed an important article of Indian export to the Roman empire (H.G. Rawlinson, *Intercourse between India and the Western World*, p.124.)
104. *Kusumbha* (XXIX.9), *Carthamus tinctorius*, bears red flowers which were used for dyeing. A cloth coloured with *kusumbha* flowers was called *kausumbha* (X.11). *Utpala* calls it *mahārajata* (on XXIX.9), which appears to be a mistake for *mahārajana* (*Amara*, II.9.106), indicating its abundant use for colouring.
105. *Kuṭaja* (XXIX.12), *Holarrhena antidysenterica*,⁹⁶ flowers during rains. It is popularly known as *kuraiyā*.
106. *Lakṣmaṇā* (LIII.48), a herb.
107. *Lakuca* (LIV.4, 10), *Artocarpus lakucha*, *Erythrina indica*.
108. *Lavalī*, *Phyllanthus districhas*. *Lavalī-phalas*, which *Utpala* explains as *Lavaṅga* flowers (for there can be no fruits, *lavalīphalaṁ lavaṅga-puṣpaṁ tasya phal-āsam bhavāt*), served as a spice in betel (LXXVI.37). A spurious verse (XXVII.5) locates *lavalī* and *lavaṅga* along the south-west coast and speaks of the south-western wind blowing unceasingly tossing up and down in the sea heaps of small cardamoms, *lavalī* and *lavaṅga*.
109. *Madana*, *Randia dumetorum*, is popularly called *dhatūrā* (cf. *Amara*, II.4.77-8). Its fruit (*madanaphala*, LVI.5) formed an ingredient of *vajralepa*, a kind of cement.
110. *Madayantikā* (LIII.102), *Jasminum zambac*.
111. *Madhūka* (XXIX.4; LIII.35, 119, LVI.5; LVIII.5; LXXXIV.3), *Bassia latifolia*, is the *mahuā* with the flowers of which wine is scented.
112. *Mālatī* (CIII.14), a *jasminum* species.
- 112a. *Mallikā* (LX.14; LXI.2), a *jasminum* species.
113. *Mañjiṣṭhā* (LVI.5; LXXVI.6), *Rubia cordifolia*, is the Indian madder

popularly called *majīṭh*. The permanent dye produced from it is alluded to in several places. The colour produced by it is called *māñjiṣṭharāga* (XII.1.9; XXX.12) and an article coloured with it *māñjiṣṭha* (X.11; XXX.14). Also called *samaṅgā* (XLIII.9; XLVII.39. cf. *Amara*, II.4.90-91).

114. *Māṣaṇṇī* (LIII.88), *Glycine debilis*.

115. *Maurvī* (LIII.87), a herb.

116. *Mokṣaka* (LIII.113), a variety of *lodhra*. Utpala informs us that it was commonly called *mañivaka*.

117. *Nāga*, *Mesua ferrea*, is the *nāgakesara* tree. We have numerous references to its flowers (XXIX.12; XLIII.10; LXXVI.13, 32; LXXXVI.24) and fruits (LVI.5). On LIII.101, where Varāhamihira refers to the *nāga* tree, Utpala says that *nāgakesara* is obtained from it (*nāgakesaram yasmād=utpadyate*) and explains *nāga-ṣuṣṭa* as *nāgakesara*. *Nāga* is generally believed to be the same as *punnāga*, but Varāhamihira makes a distinction between the two as is evident from his mention of both these side by side (LXXXVI.24).

118. *Nālikera* (LIII.40) is the coconut tree.

119. *Nandikāvarta* (XXIX.8), *Tabernaemontana coronaria*, is probably the same as the *nandivṛkṣa* of the *Amarakoṣa* (II.4.128).

120. *Navamālikā* (LIII.48), a *jasminum* species.

121. *Nicula* (XXXIX.12) is the cane reed tree mentioned as growing on sea-shore (XLVII.12) and ponds (LIII.119; LV.5). The mention of *nicula* and *vetasa* together in one and the same line (LIII.119) points to the distinction between the two. *Amara* (II.4.29-30, 61) distinguishes them from one another, but the nature of this distinction is not quite clear. Kālidāsa mentions it as growing wildly near Rāmagiri (Ramtek near Nagpur, *Meghadūta*, pūrvamegha, 14) and on the banks of the rivers Tamasā, Gambhirā and Mālinī (*Raghu*, IX.75; *Meghadūta*, pūrvamegha, 41; *Śākuntala*, III.23).

122. *Nimba*, *Melia azadirachta*, is the famous *nīm* tree. Its wood is forbidden for building purposes (LII.118). Its leaves (LIII.115) and fruits (LVI.5, 7) were supposed to possess chemical properties. Also called *picumanda* (XXIX.12 refers to its flowers, cf. *Amara*, II.4.62).

123. *Nīpa* (LIII.101, LXXXIV.6), *Nauclea kadamba*.
124. *Nirguṇḍī* (LIII.14) or *sinduvāra* (XXIX.9; LIII.101), *Vitex trifolia*.
125. *Nyagrodha* (XXIX.3; LIII.96; LXXXIV.3; LXXXV.80) or *vaṭa* (LII.83), *Ficus bengalensis*.
126. *Padmaka* (LXXVIII.2, 13), *Prunus Puddum Roxb.*
127. *Panasa* (LII.85; LIV.4, 11), *Artocarpus integrefolia*, is the famous *kaṭahala* tree.
128. *Pārijāta* (LXXVI.27), *Erythrina indica*, is the same as that called *harasiṅgār* in Hindi.
129. *Paruṣaka* (LIII.50). *Grewia asiatica*.
130. *Pāṭala* (XXIX.7), *Stereospermum suaveolens*, is a *vrkṣa-jāti* according to Utpala. The *pāṭala* flowers are slightly red (*śvetalohita*, V.58 and comm.).
131. *Pāthā* (XLVII.39), *Stephania hennandifolia*.
132. *Pattra* (XL.4; LXXVI.5, 7, 12, 23, 29, 32, 33), *Laurus cassia* or *Cinnamomum inens*, the same as *gandhapatra* or *sugandhapatra*, much used in perfumes.
133. *Pīlu* (XXIX.11; LIII.63; 65, 75), *Salvadora indica*, is even now known by this very name.
134. *Pippalī* (XVI.29; LIX.8; LXXV.11), *Piper longum*, a spicy plant.
135. *Plakṣa* (LII.83; LIII.119), *Ficus tsiela religiosa*, is a variety of the banyan tree called *pākara*.
136. *Priyaka* (XLII.15; LIV.3; LXXXIV.7). According to Amara, *priyaka* may denote *kadamba*, *jīvaka* or *priyaṅgu* (II.4.42, 44, 56). It is difficult to say which of these trees is intended here.
137. *Priyaṅgu* (XLIII.9), *Aglaiia Roxburghiana*, the same as *gandhapriyaṅgu* according to the commentator, was used in perfumes (LXXVI.8).
138. *Pūga*, *Areca catechu*. Betel nuts (*pūgaphala*, LXXXVI.2) were chewed with betel leaves (LXXVI.36, 37).
139. *Punnāga* (LII.85; LIV.3), *Calophyllum inophyllum*. Its flower is mentioned

in LXXXVI.24. It is known as *sandeśarā* in Gujarati.

140. *Pūrṇakośa* (XLIII.10; XLVII.40), a herb used in religious ceremonies.

141. *Rāja-kośātaka* (LIII.121), *Luffa amara*. Its powder was used for clearing water.

142. *Rodhra-vṛkṣa* (LXXXV.80), *Symplocos crataegoides* or *Symplacos racemosa*, is the same as the *lodh* tree.

143. *Rohita* (LIII.72) or *rohītaka* (LIII.68, 79), *Andersonia Rohitaka*, is commonly known as *rohiḍa*. It yields flowers as red as those of pomegranate (*dāḍima-puṣpaka* is another name, *Amara*, II.4.49). A white variety of *rohītaka* is referred to (LIII.84).

144. *Sahadevī* (XLIII.10; XLVII.40), a herb. According to Utpala, it was also known as *sahagandhā*.

145. *Śāka* (LIII.105; LXXVIII.2, 13, 16), the teak tree.

146. *Śāla* (XXIX.2; LII.85; LVIII.6; LXXVIII.2, 13, 16; LXXXIV.7), *Shorea robusta*, is supposed to be the same as *sarja* and both these share the same botanical name (cf. *Amara*, II.4.44, which regards them identical). But the mention of both of these in one and the same line implies some sort of distinction which is not quite clear.

147. *Śallakī* (LVI.1), *Boswellia serrata*.

148. *Śālmālī* (LVI.1), *Bombax malabaricum*, is the silk-cotton tree called *semal*. The cotton obtained from it is used for stuffing.

149. *Śamī* (XXIX.11; LII.85; LIII.83; LVIII.5; LXXXIV.6), *Mimosa suma* (*Prosopis spicigera*). We have references to knotty (LIII.81) and white *śamī* showing too many thorns (LIII.85). Its wood was believed by Sanskrit poets to possess latent fire. (Cf. *Śākuntala*, IV.3, *agnigarbhām śamīm iva*).

150. *Saptaparnā* (XXIX.4), *Alstonia scholaris*.

151. *Sarja* (XLIII.4; LIII.105; LVIII.6), *Shorea robusta*. The exudation of *sarja* (*sarja-rasa*) formed an ingredient of *vajralepa* and *vajrakalka* (LVI.3, 6) and of certain perfumes (LXXVI.11).

152. *Śatāvarī* (XLIII.10; XLVII.40), *Asparagus racemosus*.

153. *Saugandhika* (XXIX.10) is, according to *Amara* (II.4.166), a grass or white *kahlāra* (1.10,36). According to the *Haima* quoted by Bhānuji (on *Amara*, II.4.166), it may denote a grass, *gandhotpala*, *padmarāga* or *kahlāra* besides a dealer in perfumery.

154. *Śimśapa* (LIII.105), *Dalbergia sisoo*, is the *sīsam* tree. Its wood is very strong and durable and is recommended for furniture (LXXVIII.2, 12, 15), for which purpose it is still used abundantly.

155. *Sindhuka*, a tree recommended for images (LVIII.6).

156. *Śirīṣa* (XXIX.4; LIII.50; LIV.3; LIX.8; LXXXIV.4), *Mimosa sirissa*. At one place, Utpala says that *śirīṣa* flowers are bluish-yellow and at another place describes the same as whitish-yellow (*nila-pīta*, III.28; *śveta-pīta*, LXXIX.6; LXXXII.1; he makes no remark on LXXIX.11).

157. *Śivā* (XLVII.40), *phyllanthus emblica*, is mentioned as a herbaceous plant (*vīrudh*, LIII.87).

158. *Śleṣmātaka* (XLVII.4; LIV.27, 29, 30), *Cordia mixta*, is commonly known as *lasoḍā* or *bahuā* (the latter being a derivative of *bahuvāraka*, another name of *śleṣmātaka*, *Amara*, II.4.34).

159. *Somarājī* (XLIII.10) *somavallī* (LIII.108), *Proralia corylifolia*. According to *Amara*, *somavallī* is another name for *guḍūcī*, while *somavallī* and *somavallikā*, among others, are said to be synonymous with *vākuṭī* commonly known as *vakuā* (*Amara*, II.4.82-83, 95-6).

160. *Śoṇākataru* (LIII.23), *Bignonia*.

161. *Śrī* (LXXXVI.11) or *śrīvāsaka* (LVI.3) is the resin of a tree.

162. *Śṛṅgātaka* (LXXIX.17), *Trapa bispinosa*, is an aquatic creeper producing the fruit now called *siṅghāḍā*. It is noted for its three angles.

163. *Śṛṅgavera* (LXXV.11), *Zingiber officinale*, a bulbous root used in medicines and as a spice. It is popularly called *adarak* (a derivative of *ādraka*, its another name; cf. *Amara*, II.9.37).

164. *Sūkarapādī* (LIII.48), a herbaceous plant.

165. *Sūkarikā* (LIII.88), *Mimosa pudica*, is mentioned as a *vīrudh* (herbaceous plant).

166. *Sūryavallī* (LIV.22), *Gynandropsis pentaphylla*.

167. *Suvarṇataru* (LIII.70). Utpala regards it as the name of particular tree. G.P. Majumdar's rendering of it by 'any tree denominated after gold' (*Upavana-vinoda*, p.23) appears to be untenable. It may be identical with the *suvarṇaka* mentioned by Amara (II.4.24).

168. *Suvarṇāpuṣpa* (XXIX.10), *Cassia fistula*.

169. *Suvarṇāpuṣpī* (XLIII.9), mentioned as an *oṣadhi* (herb).

170. *Śyāmā* (LXXXIV.6) *Echnocarpus frutescens*, is called both a *latā* (XXIX.13) and a *vīrudh* (herb, LIII.87). Kālidāsa compares its creeper with the body of woman apparently on account of its delicacy and thinness (*Mālavikāgnimitra*, II.6).

171. *Tāla* (LIII.40, 119), *Borossus flabelliformis*, is the palmyra tree.

172. *Tālī* (XXVII.4), Talipot palm. Varāhamihira locates it in the south and speaks of the rough and howling southern wind making the monkeys dance through the leaves of palm trees, bowers of creepers and trees. Kālidāsa describes it as lining the seacoast of Kalinga (*Raghuvamśa*, XIII.15).

173. *Tamāla* (XXI.23; XXIV.17) *Cinnamomum tamala*, is noted for the dark green hue of its leaves.

174. *Tilaka* (XXIX.6; LIII.50, 73; LIV.11) bears white fragrant flowers (LXXXVI.24. CIII.47) in the spring season which were called *vasanta-tilaka* (CIII.33).

175. *Timira* (LIV.11).

176. *Tinduka* (XXIX.3; LIII.50, 112, 115; LVI.1, 5, 6; LXXVIII.2, 15), *Diospyros glutinosa*, is the ebony tree called *tendū*. Its fruit is also known by the same name.

177. *Tintiḍī* (LIV.21), *Tamarindus indica*, is the tamarind tree called *cincā* or *imalī*.

178. *Trāyamāṇā* (XLIII.10) or *trāyamāṇa* (XLVII.39), is an *oṣadhi*.

179. *Triṛtā* (LIII.48, 87), *Ipomea turpethum*, is mentioneed as a *vīrudh*.

180. *Tvac* (LXXVI.5, 6, 12, 24), cassia bark.

181. *Udumbara* (XLII.15; XLIII.4; 12, 20; LII.83; LIII.11, 18, 96; LIV.10; LIX.8),

Ficus glomerata, is called *ūmar* or *gūlar* in Hindi. Mention is made of its ripe fruit (LIII.107).

182. *Uṣīra* (LXXVI.12, 13, 29), *Andropogon laniger*.

183. *Vacā* (XLIII.9; LVI.1), *Acorus calamus*, otherwise called *vijayā* (XLVII.39).

184. *Valla* (LXXIX.7) flower is slightly yellowish (*valla-puṣpasāṅkāśam valla-puṣpanibham iṣat pāṇḍuram*, comm.).

185. *Vamśa*, bamboo, is called as a *gulma* (XI.26; XXX.27). Swords shaped like bamboo leaves were highly valued (XLIX.7). As we have seen above, a species of bamboo named *kīcaka* is specified. Also *veṇu* (XLII.8).

186. *Vānīrā* (LIV.10), *Calamus Ruxburghii*.

187. *Vaṇjula* (LIII.50; LIV.11; XCIV.16), *Calamus rotang* or *Salix tetrasperma*.

188. *Vārāhī* (LIII.87) is classed as a *vīrudh* and is probably the same as that called *vārāhikanda*.

189. *Varuṇaka* (LIII.50) is probably the same as *varuṇa* (*Croton religiosa*) mentioned in Caraka. According to Amara (II.4.25), it has its synonyms in *varaṇa*, *setu*, *tikṭasāka* and *kumāraka*.

190. *Vasanta-tilaka* (CIII.33) bears white blossoms with which are compared the grey hair of an elderly person (*vasanta-tilaka-dyutimūrdhajo*=*pi*. Cf. *Vasantatilako vrkṣas*=*tasya puṣpam*=*atīva śvetavarṇam bhavati*, Utpala). But most probably it is an allusion to the *tilaka* blooming in spring.

191. *Vāsikā* (LIV.22), *Adhatoda vasika*. *Vāṣī* (LXXIX.16) is probably the same as *vāsikā*; its fruit is said to be elongated (*vāṣīphala-pradīrghāṇi*, LXXIX.16).

192. *Vetasa* (LIV.22), *Calamus viminalis*, belongs to the *anūpa* region (LIV.11) and therefore its presence in an arid area indicates a sub-soil water-vein nearby (LIII.6, 86, 101). It is recommended for being planted on the banks of water-reservoirs (LIII.119). Its flowers are mentioned in XXIX.6.

193. *Vidārikā*, *Ipomola digitata*. The juice and root of *vidārikā* were used for medical purposes (LXXV.5, 9, 10).

194. *Vikaṅkata* (XLVII.42; LXXXIV.3), *Flacourtia sapida*, or *Gymnosporia montana*, is commonly called *kāther*.

195. *Vīraṇa* (LIII.47), *Andropogon muricatum*, is classed as a *gulma* (XXX.24).

196. *Viśveśvarī* (XLVII.39) is, according to Utpala, the same as *padmacāriṇī*, which is mentioned in Amara, II.4.146.

197. *Vyāghrapadā* (LIII.87) is classed as a *vīrudh*.

II

FAUNA

The *Bṛhatsamhitā* furnishes materials for an important chapter in the history of ancient Indian fauna. As many as seven chapters (LX-LXVI) are devoted to fauna besides much valuable information scattered throughout the work.

Classification

Varāhamihira classifies entire animal life into rural (*grāmya*⁹⁷), wild (*āranya*⁹⁸), aquatic (*ambucārin*,⁹⁹ *jalacara*¹⁰⁰ *jalacarin*,¹⁰¹ *salilacara*,¹⁰² *jalaaja*,¹⁰³ *salilaja*¹⁰⁴) terrestrial (*bhūcarin*¹⁰⁵), atmospheric (*vyomacārin*), diurnal (*dyucara*, *divasacara*, *divāsañcara*¹⁰⁶), nocturnal (*niśācara*, *kṣapācara*¹⁰⁷) and diurnal-nocturnal (*ubhayacārin*, LXXXV.6) The diurnal, nocturnal and diurnal-nocturnal creatures are enumerated in LXXXVII.1-3. Another classification was into male, female and hermaphrodite (LXXXV.6). Our author states that owing to the multiplicity of their genera it is difficult to ascertain the sex of creatures and quotes two verses from Ṛṣi (Vṛddha-Garga according to the commentator) according to which male creatures have fleshy, raised and large shoulders, broad necks, handsome breast, low but deep voice and firm courage; the females are characterised by slender breast, head and neck, short face and legs, little courage and clinging and melodious voice, and the hermaphrodites possess mixed characteristics (LXXXV.7-9). Creatures were also distinguished from each other according as they bore masculine (*punnāmānaḥ*) and feminine (*strīsamjñāḥ*) names (LXXXV.36-7).¹⁰⁸ Birds and wild animals are also distinguished from one another (*khaga-mṛga*,¹⁰⁹ *pakṣi-mṛga*,¹¹⁰ *patatri-mṛga*,¹¹¹ *mṛgāṇḍaja*,¹¹² *vihaṅga-mṛga*¹¹³). Some other modes of classification were also in vogue, e.g., according of food-habits, as *tṛṇabhuj* (V.30) or eaters of grass, and *kranyād* (XLIX.3; LXIX.22; LXX.12)¹¹⁴ or carnivorous animals; according to certain distinguishing limbs, as *damṣṭrin* (V.93; VI.3; VIII.51; XIX.1; XXXIII.9; LXXXV.44), animals with prominent teeth like the boar, dog and serpent, or *upari-damṣṭrin* (XCIV.57), animals with teeth above like the boar, *śṛṅgin*, horned animals like the deer (XVI.8; CIII.61), and *ekaśapha*, animals with

uncloven hoofs like horses and asses (V.78; LXXXV.23); according to size, as *kṣudra-jantus* (XI.45); according to habits, as *sarīṣpas*, reptiles (XXVIII.13) (LXIX.22) or *śighraga*, moving fast like the camel (V.54). The burrow-dwellers (*vileśayas*) are distinguished from the tusked animals (LXXXV.44).¹¹⁵ Caraka (I.27.35-55), it is interesting to note, classifies the animal kingdom mostly according to the habits of food and living. Thus, he knows burrow-dwellers (*bhūmiśaya*), aquatic creatures (*vāriśaya*, *vāricārin*, *ambucārin*) and wild beasts (*jāṅgalā mṛgāḥ*) besides the animals and birds that eat their food after tearing (*prasaha*), scattering (*viṣkira*) and picking it up (*pratuda*). A list of the fauna mentioned by Varāhamihira is given below.

Wild Animals

The word *mṛga* is mostly used to denote wild life in general¹¹⁶ and only occasionally the deer.¹¹⁷ The lion (*simha*¹¹⁸, *hari*¹¹⁹), the king of the wild life (*mṛgendra*), was found in the Vindhya forest (XII.6). It is noted for its tail turning from left to right (XI.47) and deep sound (LXVII.95). The elephant is referred to as *hastin*,¹²⁰ *karin*,¹²¹ *gaja*,¹²² *dvīpa*,¹²³ *dvirada*,¹²⁴ and *dantin*,¹²⁵ and its female as *karenu*.¹²⁶ Varāhamihira mentions four kinds of elephants¹²⁷— (1) an elephant with tusks coloured like honey, a well-proportioned body, uniform limbs, a backbone shaped like a bow and hips like those of a boar, and which is neither too stout nor lean and is fit for work is called Bhadra,¹²⁸ it is 7, 9 and 10 cubits in height, length and girth respectively; the colour of Bhadra and its ichor is green; (2) Manda has a loose breast and folds on the waist, long belly, thick skin and neck, long abdomen and the root of the tail, and the look of a lion; it is 6, 8 and 9 cubits in height, length and girth: Manda and its ichor are yellow; (3) Mṛga is characterised by short lips, tail and sex-organ, slender feet, neck, teeth and ears, and large eyes; its height, length and periphery measure 5, 6 and 8 cubits; Mṛga and its ichor are black; (4) an elephant with mixed characteristics is termed Sankīrṇa (LXVI.1-5). The four categories are also named by Kauṭilya¹²⁹ and Someśvara.¹³⁰ Varāhamihira also refers to four other kinds forbidden for domestication, viz., 1. Kubja, 2. Vāmanaka, 3. Matkuṇa and 4. Śaṇḍha (LXVI.10). Of these, Matkuṇa is known to Kauṭilya also.¹³¹ As we have seen above, ivory was employed in decorating furniture. Varāhamihira refers to elephants hailing from swampy and mountainous regions (XCIII.1).¹³² The tiger (*vyāghra*,¹³³ *sārdūla*¹³⁴) with its bluish-red eyes (LXXIX.9), bear (*ṛkṣa*¹³⁵), hyena (*tarakṣa*¹³⁶) and monkey (*kapi*,¹³⁷ *vānara*¹³⁸, *śākhāmṛga*¹³⁹) inhabited the Vindhyas

(XII.6), while the yak (*camarī*) roaming among the Himalayas, supplied its hair for fly-whisks (LXXI.1-2). We have also references to the cat (*bidāla*¹⁴⁰ *mārjāra*,¹⁴¹ *uṣadamśa*¹⁴²) noted for being hostile to rats (XCVI.12) and for eating the flesh of its own species (LXXXV.65), the deer, both buck (*mṛga*,¹⁴³ *harīṇa*¹⁴⁴) and doe (*mṛgī*¹⁴⁵) with their young ones (CIII.28) and no less than nine varieties, namely, *kuraṅga*,¹⁴⁶ *ruru*,¹⁴⁷ *rohita*,¹⁴⁸ *ṛṣya*,¹⁴⁹ *prṣata*,¹⁵⁰ *eṇaka*,¹⁵¹ (a black antelope), *kṛṣṇasāra*¹⁵² (spotted antelope), *chikkāra* or *dhikkāra*¹⁵³ and the musk-deer,¹⁵⁴ the boar (*śūkara*,¹⁵⁵ *varāha*,¹⁵⁶ *kroḍa*¹⁵⁷) the bison (*mahiṣa*¹⁵⁸), the wolf (*uṛka*¹⁵⁹), the panther (*dvīpin*¹⁶⁰), the jackal, both male (*śṛgāla*,¹⁶¹ *gomāyu*,¹⁶² *kroṣṭuka*,¹⁶³ *jambuka*,¹⁶⁴ *lomāśa*¹⁶⁵) and female (*śivā*,¹⁶⁶ *lomāśikā*¹⁶⁷), the porcupine (*śalyaka*,¹⁶⁸ *śvāvīdh*¹⁶⁹), the hare (*śāśa*,¹⁷⁰ *śāśaka*¹⁷¹), and the pole-cat (*jāhaka*¹⁷²).

Domestic Animals

The kine (*go*,¹⁷³ *dhenu*,¹⁷⁴ *surabhi*,¹⁷⁵ *usrā*¹⁷⁶) constituted an important item of wealth (IV.14; XIX.7, 14) and had come to be regarded as sacred.¹⁷⁷ Cows and oxen (*uṛṣa*,¹⁷⁸ *go*¹⁷⁹, *go-pati*¹⁸⁰ *anaḍuh*¹⁸¹ *surabhi-tanaya*¹⁸² *ukṣan*,¹⁸³) went out for grazing in the morning and returned home in the evening (XXIV.35). Herds of cows (*gokula*, IX.20; XIX.14) and cow-pen (*goṣṭha*, LXXXVIII.9) are also mentioned. Oxen were yoked to ploughs (XLV.62) and used as beasts of burden (LX.9, 14, 16). Varāhamihira refers to oxen with eyes hued like a beryl, a *mallikā* flower and a water-bubble (LX.14). Utpala states that eyes resembling a *mallikā* flower form really a characteristic of horses and quotes in his support an anonymous Prakrit verse¹⁸⁴ and a stanza from Śālihotra¹⁸⁵, according to which horse with dark pupils and eyes surrounded by white rings is termed Mallikākṣa. A white ox with tawny eyes, copper-coloured horns and a large face was called Hamsa (LX.17)¹⁸⁶

Of goats (*aja*,¹⁸⁷ *basta*,¹⁸⁸ *chāga*¹⁸⁹), Varāhamihira refers to four kinds— (1) Kuṭṭaka, a goat which leads a flock and enters in water first and has white head or six dark spots on its head; (2) a goat coloured like pounded sesamum (mixed white and yellow), having spotted head or neck and copper-red eyes, or a white goat with black legs and *vice versa* is termed Kuṭīla; (3) Jaṭīla is a white goat which walks with a jingling sound and has black testicles and a black band in the middle; and (4) Vāmana, a goat with blue hair and feet, or with slightly white fore part and blue hind-part (LXIV.5-9).¹⁹⁰

The age of horse (*aśva*,¹⁹¹ *turaga*,¹⁹² *turaṅgama*,¹⁹³ *turaṅga*,¹⁹⁴ *vāji*,¹⁹⁵ *haya*¹⁹⁶)

and mare (*vaḍavā*¹⁹⁷) was determined in terms of the number of their teeth. Thus, we are told that a colt of one year has six white teeth; they turn tawny when it is two years old; the incisors, the middle and the last teeth fall and reappear at the age of three, four and five respectively; the same three teeth beginning with the incisors become black, yellow, white, hued like glass, *mākṣika* (?) and conch-shell, hollow and shaky and fall at the age of eight, eleven, fourteen, seventeen, twenty, twenty-three, twenty-six, twenty-nine, and thirty-two respectively.¹⁹⁸ Jayadatta Sūri also tells us that a horse develops its teeth and testicles at the age of two to five years.¹⁹⁹ Similar directions for ascertaining the age of a horse from the number of its teeth are found in Nakula's *Aśva-cikitsita* (Ch.V), composed before AD 1000.²⁰⁰ Ten hairy circles (*āvartas*), one on the lower portion of the upper lip (*prapāṇa*), one in the hair of the forehead (*lalāṭa-keśa*), and two each in the interval between the belly and the navel (*randhra*), above it (*uparandhra*), on the head and the breast, were considered to be an essential quality of a good horse (*dhruvāvartas*, LXV.4). Jayadatta Sūri's *Aśva-vaidyaka* (III.70-72) refers to these circles by divine names, viz., Māruta, Hutāśana, Skanda and Viśākha, Hara and Hari, Candra and Sūrya, and Aśvins, and regards a horse lacking even in one of these circles as inauspicious.²⁰¹

Dogs (*kukkura*,²⁰² *śvan*²⁰³, *sārameya*²⁰⁴) and bitches (*kukkuri*²⁰⁵) were kept for watching (XXVIII.9-10; LXI.1-2). A dog with five nails each in three legs and six in right foreleg, red lips and muzzle, the gait of a lion, shaggy tail, eyes like those of a bear, and long and soft ears and which smells the ground while running is recommended for being tamed as a watch-dog (LXI.1). Similarly, a bitch with five nails in three feet and six in left foreleg, eyes surrounded by white lines, crooked tail, and long tawny ears is recommended for domestication (LXI.2).

Mention is also made of buffaloes, both male (*mahiṣa*)²⁰⁶ and female (*mahiṣī*)²⁰⁷, asses (*gardabha*,²⁰⁸ *khara*,²⁰⁹ *vāleya*²¹⁰) noted for rough voice (LXVII.95), camels (*uṣṭra*,²¹¹ *karabha*²¹²) with their crooked necks (LIII.62), mules (*vesara*)²¹³, a hybrid species begotten by an ass on a mare (LXXXV.66), and sheep (*avi*,²¹⁴ *avika*,²¹⁵ *hūdū*²¹⁶).

Birds

Of birds (*khaga*,²¹⁷ *pakṣin*,²¹⁸ *patatrin*,²¹⁹ *aṇḍaja*,²²⁰ *vihaḡa*,²²¹ *vihaṅga*,²²² *śakuni*²²³), we have references to the peacock (*mayūra*,²²⁴ *śikhin*,²²⁵ *barhin*²²⁶) crying at the

approach of rain (XXIV.19), pigeon (*kapota*²²⁷) with its three kinds, viz., grey, variegated and saffron-coloured (LXXXVII.1, 12-13), its female (*kapotaki*,²²⁸ *śyāma*²²⁹), parrot (*śuka*²³⁰) noted for its beautiful nose (LXVII.60), crow (*kāka*,²³¹ *dhvāṅkṣa*²³², *vāyasa*²³³) with its slightly blue egg (XXVIII.4) and the habits of eating flesh (XCIV.41), transmitting food into the mouth of each other (XCIV.43) and laying two, three or four eggs at a time (XCIV.6), blue jay (*cāṣa*²³⁴), owl (*ulūka*,²³⁵ *kauśika*²³⁶), hawk (*śyena*²³⁷), vulture (*grdhra*²³⁸), heron (*kaṅka*²³⁹), wagtail (*khañjana*,²⁴⁰ *khañjanaka*²⁴¹) with its four varieties, viz., Bhadra (with stout body and black raised neck), Sampūrṇa (dark from the face to the neck), Rikta (with white cheeks and a dark spot on the neck) and Gopīta (yellow²⁴²), cuckoo (*kokila*²⁴³) brought up by others, i.e., crow (*anya-bhṛta*,²⁴⁴ *para puṣṭa*²⁴⁵), its male (*puṁskokila*²⁴⁶), cock, both male (*kukkuṭa*²⁴⁷), *kṛkavāku*²⁴⁸, *tāmracūḍa*²⁴⁸ and female (*kukkuṭi*²⁵⁰), along with the variety called *gartā-kukkuṭa* or *kulāla-kukkuṭa* (LXXXVII 8, 22), sky-lark (*bhāradvāja*²⁵¹) along with its female (*bhāradvājī*²⁵²), sparrow (*caṭaka*²⁵³, *kalaviṅka*²⁵⁴) noted for its strong sexual desire (LXXV.7), hen-sparrow (*vaṭikā*, *sūkarikā*)²⁵⁵, *jīvaṇvaka*²⁵⁶ (a pheasant), *hārīta*²⁵⁷ (a kind of pigeon), wood-pecker (*śatapatra*²⁵⁸, francoline partridge (*tittira*²⁵⁹), bee-eater (*divyaka*, *dhanvana*)²⁶⁰, the Greek partridge (*cakora*), *ulūkaceṭi*, also known as *piṅgalā*,²⁶¹ *piṅgalikā*, *pecikā*, and *hakkā*²⁶² (a kind of owl or a crane, LXXXVII.4), *sārikā* (falking maina, *Garcula religiosa*, LXXXVII.30), *valgulī* (LXXXVII.2), a nocturnal bird, *pīppikā* (LXXXV.38), *bhāṇḍika* also called *durbalika* (LXXXVII. 7, 28-30), *aṇḍiraka* (LXXXVII.26), *napṭṛka* (LXXXV.49), *phenta* (LXXXVII.1, 26) or *phentaka* (LXXXVII.31), *pirilī* (LXXXV.20, 44), simhanāda (LXXXV.20) *krakara* (a kind of partridge, XLVII.6), *kūṭapūrī* (LXXXV.20, 44), also known as *karāyikā* (LXXXVII.16-17; XCIV.1), *bhaṣa*, *bhaṣaka* (LXXXV.38), *kūṭapūra*, *kurabaka* and *pūrṇakūṭa* (a small kind of crane, LXXXVII.4), *plava* (a kind of duck, LXX.12), *śrīka* (XLVII.6) or *śrīkaṇṭha* (LXXXV.38), *śrīkaṇṭha* (LXXXV.38; LXXXVII.27), *kapiñjala* (a kind of partridge, XLVII.6; LXXXV.22), *bhāsa*²⁶³ (LXXXV.38), *pārāvata* (turtle-dove, XLVII.6; XLIX.25; LIII.10 108), *vañjula* (XLVII.6; LXXXV.20, 48), also called *vañjulaka* and *khadiracañcu* (LXXXVII.5, 11), *sātaka* (*Cuculus melanoleucus*, XXVIII. 14; LXXXV.27) crying in rains (XXIV.19), *koka*²⁶⁴ (a ruddy goose or cuckoo, LXXXV.21), *kāraṇḍava* (a duck, XLVII.9; LV.5), *cakravāka* (a ruddy goose, *cakavā* in Hindi, LV.5), *haṁsa* (a swan²⁶⁵) eating lotuses (*abjāda*, LXXXV.27), *kalahaṁsa* (a sort of white goose with red beak and legs²⁶⁶ XLVII.10; LXIX.7) noted for its sweet voice, *balākā* (a small crane, XXIV.17), *sārasa* (XLVII.9; LXXII.1; LXXXVII.37), *kurara* (XLVII.9) or *utkrośa* (an osprey, LXXXV.22) and *krauñca*²⁶⁷ (a curlew or heron).

Reptiles

Amongst reptiles (*sarīsrpa*) are mentioned serpents (*ahi*,²⁶⁸ *bhujaga*,²⁶⁹ *bhujāṅga*,²⁷⁰ *dyāla*,²⁷¹ *sarpa*,²⁷² *phaṇin*,²⁷³) with their white belly and black back (XXIV.13; LIII.66), mungoose (*nakula*,²⁷⁴) noted for its hostility towards rats (XCVI.12), mice (*ākhu*,²⁷⁵ *mūṣaka*,²⁷⁶) squaint-eyes (*hekara*, LXVII.65), musk rats (*chucchū*,²⁷⁷ *chuchundarī*, *nṛpa-sutā*,^{277a}) and lizards of various kinds, viz., *godhā* (big lizard),²⁷⁸ *saraṭa*,²⁷⁹ *kṛkalāsa*,²⁸⁰ (a lizard which frequently changes its colour), *chippikā*,²⁸¹ *grhagodhikā*,²⁸² *kudya-matsya* (small house-lizard).

Aquatic Animals

Of aquatic animals, mention is made of alligators (*nakra* XXVIII.14; XXXIII.9; *makara*, LXVIII.17; *grāha*, XCIII.14) capable of devouring elephants; various kinds of fish (*matsya*,²⁸³ *jhaṣa*,²⁸⁴ *mīna*,²⁸⁵ *pr̥thu-loman*,²⁸⁶), viz., Rohita (Rohi in Hindi, LIII.15), Śapharī (a smaller variety, LV.6), that smelling like a goat (*ajagandhaka*, LIII.22) and Timi (Whales, XII.3) noted for its white complexion (XII.5), oysters (*śūkti*), conch-shells (*śaṅkha*, XII.4), watery serpents (*jala-jihmaga*) and elephants (*jalebha*, XII.3), frogs (*maṇḍūka*,²⁸⁷ *dardura*,²⁸⁸ *bheka*,²⁸⁹), yellow, black or green in colour (LIII.7, 18, 30, 39, 67) and crying at the approach of rains (XXIV.19; XXVIII.4), and tortoises (*kūrma*, LIII.44; LXIII.1, 13; *kacchapa*, XXVIII.14; *kacchapakā*, LIII.34), kept in pleasure lakes or wells (LXIII.3),²⁹⁰

Insects

Of insects, there were mole crickets (*ralā*, *srotobhedya*, *taḍāgabhedya*, *ekaputraka*, *kalahakārikā*, LXXXV.37; LXXXVII.6) with their body measuring two *aṅgulas* and crying at night, scorpions (*vṛścika*, XLIX.3; LIII.73), locusts (*śalabha*, VIII.4), flies (*makṣikā*, XCVI.7),²⁹¹ ants (*pīpīlikā*) indicating rain when they shift their eggs (XXVIII.7) or carry them from a low-lying place to a tree or an elevated ground and drought when they throw them in water (XCIV.59) and various kinds of bees, namely, *madhukara* (XXIV.14) or *ṣaṭcaraṇa* (large black bee, CIII.17,32) and *madhu*,²⁹² (honey-making bees, XCIV.58).

We may conclude our study of fauna with a few general remarks. The mule was recognised as the only hybrid breed, other animals cohabiting with different species being supposed to augur calamity (XLV.55; LXXXV.66) The serpent, mouse, cat and fish eat the flesh of their own species (LXXXV.65). The delivery

of twins by a mare, camel, buffalo, cow and she-elephant is said to bring about their death (XLV.52). The dewy season, it is stated, is the mating period of the *rohita*, horse, goat, ass, *kuraṅga*, camel, deer and hare; the spring season, of the crow and cuckoo; Bhādrapada, of the boar, dog and wolf; the autumn, of the swan, cow and *krauñca*; Śrāvaṇa, of the elephant and *cātaka*; and winter, of the tiger, bear, monkey, panther, buffalo and the burrow-dwellers (LXXXV.26-28).

III

ARTS AND CRAFTS

The remarkable advance of industry and of technical skill in all branches of arts and crafts and the ever-expanding activity which our period witnessed led to a phenomenal rise in the number of specialised occupations practised by the people. The following information is elicited from Varāhamihira's works.

I. Arts and Crafts

Ivory

Of the numerous arts and crafts practised by the people that of the ivory-carver was one of the most important. Though due to the extreme fragility of the material, very few specimens of ancient Indian ivory carving have been recovered by the spade of the archaeologist,²⁹⁴ literary²⁹⁵ and epigraphic²⁹⁶ evidence leaves no room for doubt regarding the high antiquity and prosperous condition of this art. Ivory was put to various uses, one of them being, as stated above, inlay with wooden furniture. The demand of ivory objects was so pressing that it could not be satisfied by the immense indigenous resources and recourse had to be taken to imports from outside. Cosmas Indicopleustes, who travelled through India in the middle of the sixth century AD, informs us that India imported ivory from Ethiopia where elephants were more numerous and their tusks larger than those of their counterparts in India.²⁹⁷

Varāhamihira refers to ivory objects (*nāgadantaka*, LII.60; *dantaghaṭita*, LXXXVI.9) and furnishes some interesting information regarding the suitability of the portion of elephant's tusk to be employed in decorating furniture. We are told that the portion of the tusk equal to two circumferences at the bottom which

is hollow should be rejected. In the case of elephants hailing from marshy regions (*anūpa*) a little more portion is to be rejected, and in the case those hailing from a mountainous tract, a little less.²⁹⁸ The same direction is contained in the *Arthaśāstra* which adds that the tusks of the elephants born in a region irrigated by rivers should be cut off once in 2½ years, while those of the elephants hailing from a mountainous region once in five years.²⁹⁹ Great emphasis was laid on the excision of the tusk and good or bad results were anticipated according as the figures made by excision were of auspicious or inauspicious objects.³⁰⁰ Generally speaking, white, even, fragrant and glossy venation was regarded as auspicious.³⁰¹

Ivory objects formed an important item of India's export trade with the Roman empire. The *Periplus of the Erythraean Sea* (56-62) includes ivory in the list of articles exported from Barygaza and South Indian ports.

Other Animal Products

Among other animal products we have references to honey,³⁰² bees' wax (*sikthaka*, XXVI.8; *madhūcchiṣṭa*, XVI.24), musk (*mṛga*, LXXVI.12, 27; *kastūrikā*, LXXVI.16), pearls (Ch.80), corals (LXXIX.5), conches (VII.6; XIV.4; XV.25, etc.), fly-whisk (Ch.71), hide (XLI.6) and leather articles (LXXXVI.8) like containers (YY, I.4) and footwears (*upānah*³⁰³). Skins of oxen, lions, tigers and wild cats were used as seats, especially while observing religious rites (XLVII.43-5). We have references to tanners (*carmakara*, LXXXVI.35; *carmaśilpin*, LXXXVI.8) also.

Metal-work

Metal industry had reached a high watermark of development long prior to Varāhamihira. Mention is made of mines (*ākara*)³⁰⁴ spoken of as a source of prosperity to the country (*ākarādhyā*, XIX.6, 17); and miners (*ākarika*).³⁰⁵ As will be shown in a subsequent section, at least twenty-three precious stones are named. As for metals (*dhātu*, XVI.14; CIII.12, 61), we find mention of gold (*kanaka*³⁰⁶, *kāñcana*,³⁰⁷ *cāmīkara*,³⁰⁸ *niṣka*,³⁰⁹ *suvarṇa*,³¹⁰ *hiranya*,³¹¹ *hema*³¹² *śātakumbha*³¹³), silver (*rajata*,³¹⁴ *rūpya*³¹⁵), copper (*tāmra*³¹⁶), iron (*kṛṣṇāyasa*,³¹⁷ *kṛṣṇa-loha*³¹⁸, glass (*kāca*³¹⁹) lead (*sīśaka*³²⁰), bell-metal (*kāmsya*³²¹) and iron-rust (*rītikā*³²²). The goldsmith (*hiranyapanya*, V. 74; *hairanyaka*, LXXXVI.32, *suvarṇakāra*, LXXXVI.30) satiated the aesthetic sense of the people by manufacturing ornaments. Gold was used in fashioning weighing balances, sacrificial ladles, thrones and images and in

covering bedsteads.³²³ Certain processes adopted by workers in gold are repeatedly alluded to, e.g., melting (*druta-kanaka*, I.1; XXVIII.3), heating in the fire (*santāpa*,³²⁴ *paritāpa*³²⁵), whetting at touch-stone (*nikaṣa*³²⁶), and hammering for testing its purity (*abhiniveśa*³²⁷). The heating of copper, evidently for casting it into various shapes, is also referred to (VI.13). As one of the major processes followed by smiths in their work is heating the metal in fire, they are often described as 'earning their livelihood by fire'.³²⁸ It is usually held that, as at present, silver was not mined in ancient India also.³²⁹ It is, therefore, interesting to note that Varāhamihira shows acquaintance with silver-mines (*rajatākara*, XVI.26). That silver was probably mined in India in those days would appear from a perusal of Yuan Chwang's account; he tells us that 'gold, silver, Ti-shih (bronze)... etc. are products of the country which are very abundant.'³³⁰ We learn from him that gold and silver were obtained from Bolar (Little Tibet), Takka, Kulūta, and Śatadru in Panjab, and from Sindh. Weighing balances, ladles, vessels, statues and thrones were fashioned from silver.³³¹ Copper thrones (XLVII.46) and images (LIX.4) are also noticed. Many specimens of copper sculptures have been reported in archaeological excavations. The most outstanding example of copper-work in the Gupta age is the colossal Buddha image, 7½ feet high, from Sultanganj, now in the collection of the Birmingham Museum.³³² In a six-storeyed building at Nālandā, Yuan Chwang found king Pūrṇavarmā's copper image of Buddha more than 80 ft. high.'³³³ For manufacturing images of such extraordinary dimensions large copper-foundries must have been needed.

The words *loha* and *ayas* were used as generic names for less costly metals in general as is clear from the use of the former in plural (XXVIII.5; XL.6).³³⁴ In his gloss on XL.6, Utpala says that *loha* may denote iron (*āyasa*) or bell metal (*kāṁśya*). The word *kṛṣṇa* is sometimes prefixed to *loha* (XL.7; CIII.63) and *ayas* (LXXXVI.26) in order to distinguish iron from copper or bell metal.³³⁵ The history of such a loose use of *ayas* goes back to the *R̥gveda* where its exact connotation cannot be determined precisely. The fact of the accumulation of rust on iron and its musty smell in the rainy season is noticed (XXVIII.5). The best extant illustration of iron-manufacturers' skill is the well-known Mehrauli pillar with the inscription of Candragupta, usually identified with Candragupta II. This iron column which, including the capital, is 23 ft. 8 inches high and weighs more than six tons, is, to quote Percy Brown, 'a remarkable tribute to the genius and manipulative dexterity of the Indian iron-worker.'³³⁶

Pottery

Pottery formed one of the most essential necessities of every day life. Like the oil-miller, the potter (*ghatakāra*, XV.1; VP,9; *ghatakṛt*, XVI.28) also worked with the wheel and was consequently known as *cākrika*³³⁷ and *cakracara* (X.9,12). Among the clay objects (*mṛṇmaya*, LXXXVI.12) manufactured by him may be included a remarkable variety of vessels,³³⁸ burnt bricks (LII.23; LXXXVIII.1) and clay figures and figurines (LIX.4; VP,9ff.). We have a reference in the *Vivāhapaṭala* to the employment of expert sculptors for fashioning such clay figures. Both the wheel-turned and moulded pots reported from excavations at Ahicchatrā, Bhītā, Basarh, etc.,³³⁹ attest the remarkable efficiency of potters in their art. Clay figures and figurines were a rage in those days and we have references in contemporary literature to their use for decorative purposes.³⁴⁰

Wood-Carving

The carpenter (*takṣan*, XLII.20; LXXXVI.20, 24; *vardhakin*, XLII.22) enjoyed a unique position in the rural economy. As he used a measuring thread or rope, he came to possess the secondary designation of *sūtradhāra* (XLII.12). Vātsyāyana (I.3.16) includes wood-carving (*takṣaṇa*) in the list of sixty-four arts. The carpenter cut trees for his raw material (XLII.12,19), manufactured conveyances like the cart and raised wooden structures (LII.23)³⁴¹ The highly advanced state of the wood-worker's craft is evident from the fact that technical names had to be coined for various kinds of holes in the wood.³⁴²

Masonry

Varāhamihira mentions stones hued like a dove (LIII.10, 108), saffron (LIII.26), collyrium (LIII.11,110), cow's milk (LIII.20), cloud (LIII.30, 107), frog (LIII.32), horsegam (LIII.36), emerald (LIII.46), copper (LIII.71) and rice-flour (LIII.73). Mention is also made of green (LIII.34) and blackish-white (*dhūsara*, LIII.44) stones and of those called *putābī*³⁴³ or *puta-bhedaka*³⁴⁴ and *kuruvinda* (corundum, LIII.28), all to be found underground. The last is a precious stone (LXXXI.1) next only to the diamond in hardness. The rocks of the hue of cat's eye, green gram, ripe fig, *bhaṅgāñjana* (a kind of toilet collyrium), honey, *ghee*, linen, *soma* creeper, ashes, camel, ass, bees, *aṅguṣṭhikā* flower, the sun, fire, moonlight, crystal, pearls, gold, sapphire, red arsenic, the rays of the rising sun,

and yellow orpiment as also those of brown and pale white colours and those accompanied by red or variegated spots are referred to. They were believed to be haunted by the Yakṣas and Nāgas and capable of averting drought (LIII.107-111).

Varāhamihira is acquainted with no less than four methods which were employed in breaking hard rocks in those days.

- (i) A rock found unbreakable by hammering should be heated in the fire made from the fuel of the *palāśa* and *linduka* until it assumes the hue of the fire, and then sprinkled with lime water (*sudhāmbu*). Thus it becomes breakable.
- (ii) The ashes of the *mokṣaka* tree and reeds should be boiled in water and sprinkled on the rock after it is heated in the above manner. This process should be repeated seven times.
- (iii) The butter-milk, *kāñjī*, liquor, horse gram and jujube fruits should be kept together for seven nights and then sprinkled on the heated rock.
- (iv) The leaves and bark of the *neem* tree, sesamum stalks, *apāmārga*, *linduka* and *guḍūcī* should be burnt down to ashes and steeped in bovine urine. This preparation should be sprinkled seven times on the heated rock. Then it breaks.³⁴⁵

II. Other Occupations

The oil-miller (*tailika*, X.5; XVI.31) worked with the wheel and was, therefore, called *cākrika*³⁴⁶ (X.9) and *cakracara* (X.12). In inscriptions, oil-men are referred to as *tailikā*³⁴⁷ and *tila-piṣaka*³⁴⁸ and are represented as having formed their own guilds. The perfumer (*gandhayuktijña*, XV.12; *kācchika*, LXXXVI.41) catered to the aesthetic needs of society by manufacturing various kinds of perfumes. His was a specialised art and an independent science called *gandhayukti* had come into existence. Satisfying the aesthetic needs of the people were also specialists in ornaments (*bhūṣaṇajña*, XV.12), jewellers (*mañijña*, XV.12; XVI.17), garland-makers, both male (*mālākāra*, X.9; LXXXV.32) and female (*mālākārī*, LXXVII.9), barbers (*nāpita*, X.9; XV.1; L.5; *nāpitī*, LXXVII.9), toilet-attendants (*prasādhaka*; XVI.17), dyers³⁴⁹ (*rajaka*, X.5, XV.22; *rāgañña*, XV.12; *rajikā*, LXXVII.9), tailors (*sūcika*, X.9), weavers (*tantuvāya*, XV.12; *kaulika*, LXXXVI.20), architects and

sculptors (*sthapati*),³⁵⁰ musicians (*geyajñā*³⁵¹ *gāndharva*,³⁵² *gandharvika*³⁵³), instrumentalists (*vādaka*, X.3), bards (*māgadha*, X.10; *cāraṇa*, XLII.66; LXXXVI.6; *vandin*, XLVII.49; *vṛttaka*, LXXXV.68), dancers, both male (*nartaka*, X.3; XVI.19; XLII.26) and female,³⁵⁴ actors (*naṭa*³⁵⁵ *raṅgopajīvyā*³⁵⁶), painters (*citrajñā*, X.10; *citrakara*, LXXXVI.15; *citrakṛt*, LXXXVI.40; *lekhyajñā*, XV.12; XIX.10; *ālekhyajñā*, XVI.18) and magicians and jugglers (*indrajālajñā*, XVI.18; XIX.10; *kuhakajñā*, LXXXV.32; *kuhakajīvaka*, XVI.18; XIX.10).

A very large number of the copper-plate grants of the Gupta and subsequent periods has come down to us. The engraving of these records must have required great skill on the part of engravers and writers (*lekha*).³⁵⁷ *Pustavārta* (LXXXVI.37) is another interesting term in this connection. In Gupta inscriptions mention is often made of an official called *Pustapāla*, probably the Keeper of Records.³⁵⁸ Mention is also made of another official called *Kāyastha*.³⁵⁹ The *Prathamakāyastha* referred to in the Damodarpur CP. inscr.³⁶⁰ was probably 'the chief scribe, who may have acted as chief secretary to the Administrative Board'³⁶¹ (*adhikaraṇa*) of which he was a member'.

Among others we have references to artisans in general (*kāruaka*³⁶² *śilpin*,³⁶³ *kalā-vidvā*³⁶⁴), dealers in flowers, fruits and roots (*kusuma-phala-mūla-vārta*, V.77; XV.17; *maulika*, IX.32), distillers (*saundhika*),³⁶⁵ sellers of liquors (*mādhvikavikraya*, L.5; *rasavikrayin*, (X.8), slaughterers (*saunika*, L.21), fishermen (*matsyabandha*, XV.22; *kaivarta*, XVI.32; XVII.17; L.21; LXXXVI.7; *dhivara*, LXXXVI.34; *jalaajājīva*, XI.55), fowlers and hunters (*vyādha*, LXXXVI.10; *pāśika*, XV.22; CIII.63; *śākunin*, LXXXV.31; *śākunika*, XV.22; XVI.32; LXXXVI.34; *saukarika*, XV.22; XVI.32), makers of bows (*dhanuṣkara*, V.73), conveyances (*yānakara*, X.17) and bridges (*setukara*, XV.18), mechanics (*yantravid*, XVI.17), farmers (*lāṅgalajīvin*,³⁶⁶ *karṣaka*,³⁶⁷ *kṛṣikara*³⁶⁸ *kṛṣikṛt*,³⁶⁹ *kṛṣirata*,³⁷⁰ *kṛṣijīvin*,³⁷¹ *kṛṣīvala*³⁷²), catchers of elephants (*dvipagrāha*, X.9. Cf. LXXXVI.17), carters (*śākaṭika*, X.4; XV.2. Cf. VIII.3), soldiers,³⁷³ physicians (*vaidya*³⁷⁴, *āyusyaajñā*³⁷⁵ *bhiṣaj*³⁷⁶), surgeons (*śalyahṛt*, V. 80), sailors (*nāvika*³⁷⁷, *naujīvika*³⁷⁸ *naukarṇadhāra*,³⁷⁹ *potaplava*³⁸⁰), proclaimers (*ghauṣika*³⁸¹), bell-ringers (*ghāṇṭika*, X.6, 12), sellers of water (*vārijīvaka*, XV.18; *vāryupajīvin*, V.42; *salilopajīvin*, XV.6³⁸²), diviners (*ikṣaṇika*³⁸³), mid-wives (*dhātṛi*, LXXVII.9), executioners (*vadhika*, XVI.12; *vadharata*, *bandharata*, XV.4; *bāndhana*, XVI.32) and labourers (*karmin*, LII.109; LXXXV.44).

III. Slavery and Labour

Labour and capital are the two most important factors in the production of wealth. In ancient India three kinds of labour—slave, hired and forced—were current and are referred to by our author. The institution of slavery existed as an essential element in the social and economic life of all the ancient nations, India being no exception. Varāhamihira refers to both male and female slaves³⁸⁴ and speaks of the possibility of a girl born under the influence of a certain combination of stars and planets being enslaved (*BJ*, XXIV.3). Mention is also made of the *garbhadāsa* (*BJ*, XXIII.14) who corresponds with the *udaradāsa* of Kauṭilya, Manu and Nārada.³⁸⁵ *Garbhadāsa* is 'one who is born to a *dāsī* from a slave.' There is an allusion to the prosperity of slaves (*dāsa-parivṛddhi*, IX.21), indicating that they could own property.³⁸⁶

Hired labour also substantially contributed to the production of national wealth.³⁸⁷ Apart from references to the people earning their livelihood by servile work or craft (*antyavṛtti*, *BJ*, XII.15; *antyaśilpa*, *ibid.*, XVIII.11) and low services (*nīcakṛt*, *ibid.*, XVIII.3), we find mention of persons working for others.³⁸⁸ Amongst the hired servants (*bhṛtaka*³⁸⁹ *bhṛtya*³⁹⁰, *preṣya*³⁹¹) attention may be drawn to cowherds and shepherds (*gopa*,³⁹² *gopālaka*³⁹³, *paśupa*³⁹⁴, *paśupālaka*³⁹⁵), grooms (*turagopacāraka*, X.3; *hayapa*, IX.35), elephant-drivers (*mahāmātra*³⁹⁶), charioteers (*sūta*, X.10; LXXXVI.20; *rathika*, XV.11), messengers (*dūta*, X.10; XIX.12; LXXXVI.8; *dūti*, LXXVII.9; *cara*, X.10; *lekhaḥara*, XV.3), diggers of wells (*kūpakṛt*, IX.30), carriers of loads (*bhāravaha*, LXXXVI.24; *bhārodvaha*, V.42) and domestic servants (*sevaka*, V.34; *sevājana*, XV.30; *sevābhirata*, XV.5). The number of hired, particularly domestic, servants, appears to have been very large and there are references to persons having numerous servants.³⁹⁷

Though there is only one reference to free forced labour (*viṣṭi*) in Varāhamihira (*BJ*, XVIII.11), a large number of epigraphs recording grants of land with or without right to forced labour indicate its prevalence during our period. The famous Junagadh inscription states that Rudradāman I got the Sudarśana lake repaired without exacting from his subjects taxes, forced labour and voluntary contributions (*apīdayitvā kara-viṣṭi-praṇaya-kriyābhiḥ paura-jānapadam janam*)³⁹⁸, indicating that forced labour was usually exacted for works of public utility.

IV TRADE

The goods manufactured by industrial workers must have been distributed far and wide through the channel of brisk inland and overseas trade, which contributed in no small proportion to the affluence and prosperity of the period. Besides the lure of wealth, the blessings of a large unified empire and long-enduring peace such as secure trade routes must have provided an additional incentive to traders, whose unceasing activities were in evidence long before the Gupta age. India's trade was not confined to her own limits; but, as in earlier period, she had commercial relations with many other nations of the world. We know from Fa-hien, Yuan Chwang and Cosmas Indicopleustes that India had regular commercial ties with China, Ceylon and other countries in the east and with Persia, Ethiopia, Egypt and Byzantine Empire in the west.

Internal Trade

There were local markets in villages and towns where well-decorated shops³⁹⁹ lined both sides of the street. Besides ordinary shopkeepers (*āpaṇastha*)⁴⁰⁰ and traders (*vaṇij*⁴⁰¹, *vāṇijaka*⁴⁰², *paṇyavṛtti*⁴⁰³, *paṇyāśrayin*⁴⁰⁴), rich businessmen (*arthapati*)⁴⁰⁵ are also mentioned. The former probably satisfied local needs of the people, while the latter hoarded commercial commodities and carried them to distant places for the sake of gain.

Means of Transportation

Varāhamihira refers to conveyance as *vāhana* and *yāna*.⁴⁰⁶ The bullock-cart (*śakata*)⁴⁰⁷ was used both as a means of transporting goods⁴⁰⁸ and as a conveyance.⁴⁰⁹ Of its components, mention is made of the wheel (*cakra*⁴¹⁰), the spoke (*ara*⁴¹¹), the rim (*nemi*⁴¹²), axle (*akṣa*⁴¹³), axle-pins (*aṇi*⁴¹⁴) and the yoke (*yuga*⁴¹⁵). We have also references to chariots⁴¹⁶, evidently used as conveyance. Indra's chariot is described as dazzling, 8-wheeled and as bedecked with variegated gems (XLII.6). The noise produced by a group of chariots was regarded as auspicious.⁴¹⁷ Chariots were usually drawn by horses; but Utpala (on XLII.34) refers to *goratha*, a chariot drawn by oxen. *Śibikā*⁴¹⁸ is the palanquin carried by men on their shoulders. It is still in use in some parts of India. There

is a curious reference to a man riding another man (LXXXV.73). It seems to be the same as the *narayāna* mentioned in YY, VII.20. What it was like is difficult to ascertain. It probably refers to some manned conveyance. Of animals, horses and elephants were employed for covering long distances.⁴¹⁹ Horse-riders (*turagāroha*⁴²⁰) are also noticed. A special blanket called *kutha*⁴²¹ was spread on the elephant's back before riding it. Utpala calls it *vāraṇa-kambala*.⁴²² Bulls were used as beasts of burden and probably for riding also,⁴²³ as may be inferred from references to bulls equal to horses in speed. The boat (*navi*⁴²⁴) and the ship (*pota*⁴²⁵) are the water-transport mentioned in our work. Sailors of boats⁴²⁶ and ships⁴²⁷ are also alluded to. As we have seen above, men were also employed for carrying wares. River-navigation was in a fairly advanced state and traders often frequented water routes (*jala-mārga*).⁴²⁸ There are many references to bridges (*setu*).⁴²⁹

Caravan Trade

The traders organised themselves into large bands (*sārtha*⁴³⁰) led by the *sārthavāha*⁴³¹ or *pradhāna*.⁴³² Sometimes there were more than one leader and in such cases one superior by birth, learning and age was regarded as the seniormost.⁴³³ In spite of so much care, robbers sometimes got the upper hand, and Varāhamihira speaks of ruin and loss of wealth to caravan traders.⁴³⁴ Kālidāsa also (*Mālavikāgnimitra*, V) gives pathetic account of the plight of a caravan that was going from Vidarbha to Vidiśā. A seal from Basarh (ancient Vaiśālī) describes one Doḍḍa as a *sārthavāha* and from some other seals we learn that the *sārthavāhas* along with the *śreṣṭhin* and merchants constituted a *nigama* (corporation⁴³⁵). The unique position enjoyed by the *sārthavāhas* in town life in those days is clear from the Damodarpur copper-plate inscriptions which inform us that they had their representatives on the Administrative Board (*adhikaraṇa*) of the Koṭivarṣa *viśaya*.⁴³⁶

Guilds⁴³⁷

The artisans practising the same craft often organised themselves into a guild (*śreṇī*⁴³⁸) under their president called *śreṇīśreṣṭha*⁴³⁹ or *śreṣṭhin*.⁴⁴⁰ At Basarh have been discovered, as noted above, some sealings of the corporation (*nigama*) of bankers, traders and merchants, sometimes associated with those of private individuals, who were apparently its members. This, according to Bloch, suggests

that during those days something like a modern chamber of commerce existed in upper India at some big trading centre, perhaps at Pāṭaliputra, wherefrom members issued directions to their local agents.⁴⁴¹ Some epigraphic records of the Gupta as well as earlier period furnish specific references to artisans' guilds and add considerably to our knowledge about their functioning. Thus, there are references in earlier inscriptions to the guilds of *koṇācikas*⁴⁴² (?), bamboo-workers, braziers,⁴⁴³ *kularikas* (perhaps potters), *deḍayatrikas* (?), oil-millers,⁴⁴⁴ weavers,⁴⁴⁵ and *samitakaras* (wheat-flour-makers?).⁴⁴⁶ Weavers' and oil-men's guilds are also named in the Mandasaur inscr. of the time of Kumāragupta and Bhandhuvarman⁴⁴⁷ and Indore copper-plate inscr. of the time of Skandagupta⁴⁴⁸ respectively. These guilds served some very useful purposes in the then Indian economy. People deposited with them sums of money, sometimes very large, as perpetual religious endowments out of the interest of which certain specific expenses were to be defrayed.⁴⁴⁹ We have instances of guilds undertaking in their collective capacity certain pious acts. Thus, a silk-weavers' guild is said to have built a Sun-temple at Mandasar in AD 437-38 and repaired the same in 473-74.⁴⁵⁰ The guilds also enjoyed perfect freedom of immigration. As an instance may be cited the case of a silk-weavers' guild which migrated from Lāṭa to Daśapura (mod. Mandasaur).⁴⁵¹ The high degree of prestige enjoyed by the guilds is obvious from the inclusion of the *nagaraśreṣṭhin*⁴⁵² in the *adhikaraṇas* (Administrative Boards) of Koṭivarṣa *viṣaya*⁴⁵³ and of Puṇḍravardhana.⁴⁵⁴

Regional Products

Ordinary regional economic products were, as usual, consumed locally, whereas their surplus was exported to those areas where they were not produced. The long-distance trade was instrumental in bringing about different parts of the country closer, for they had to depend, to a certain extent, on the economic products of one another. Spices like small cardamoms, averyhoas and cloves which found favour throughout the country were grown in the coastal region of the south-west and exported elsewhere from there.⁴⁵⁵ Areca-nuts, *aguru* and *pārijāta* were similarly obtained from the north-east.⁴⁵⁶ Pepper (*marica*)⁴⁵⁷ is not assigned to any region, but it was undoubtedly a famous product of the south and formed an important article of export to other countries⁴⁵⁸. Sandal-wood, which was so commonly used in those days, grew on the Malaya mountain (southern parts of the Western Ghats below the Kāverī) and was consequently called *malaya*.⁴⁵⁹ Yuan Chwang⁴⁶⁰ also regards it as a product of Malaya, and according to Cosmas (XII),

it was exported to western ports, Persia and Ethiopian coast through Ceylon. An incense called *silhaka* was obtained from the Turuṣka country (probably Bactria) and was, therefore, named *turuṣka*.⁴⁶¹ According to the *Amarakoṣa* II.6.128), *silhaka* was derived from the *Turuṣka* and Yavana countries. The incense called *cola*,⁴⁶² it may be suggested, was probably so called because it was obtained from the Tamil country. According to a *Nighaṇṭu* stanza cited by Utpala, saffron was derived from Kashmir.⁴⁶³ Amara (II.6.123-4) mentions Kashmir and Vāhlika as sources of saffron. Kālidāsa⁴⁶⁴ describes saffron grown on the banks of the Indus. Of the animal products, yak's tail was secured from the Himalayan region.⁴⁶⁵ As to ivory, Varāhamihira merely mentions elephants of the moist and mountainous regions without any specification.⁴⁶⁶ Kālidāsa associates them with Kalinga, Kāmarūpa and Aṅga.⁴⁶⁷ Rock-salt was derived from the rock-salt deposits of the Panjab Salt Range and Kalat District now in Pakistan and was called *saindhava*. Diamonds, pearls and other precious stones were mined in several localities as will be shown in the following section. The widespread use of all these articles referred to in the preceding chapters testifies to the existence of an extensive trade in these and other commodities.

Prices

The system of state control of prices which appears to have been enforced in an earlier period⁴⁶⁸ was no more in vogue. The fluctuation of prices, as usual, must have been determined by economic factors, such as rules of demand and supply. The tendency of hoarding commercial wares and earning surplus profits by selling them at a suitable time appears to have been very much in evidence. Thus, merchants often hoarded corn, liquids, honey, perfumes, oil, ghee, jaggery, metals, jewels, pearls, skins, weapons, armours, chowries, donkeys, camels, horses, fabrics, blankets, flowers, fruits, bulbs, roots, saffron, conches, corals, glass, etc., for a period ranging from one month to two years after which they sold them at fabulously high prices, sometimes amounting to twice or thrice the prime cost, thus deriving large profits (XLI.3-12). But sometimes, under adverse circumstances, prices went down and merchants had to suffer heavy losses (XXXIX.11; XLI.5, 6). This well-contemplated but, apparently sudden, rise and fall in prices is sought to be explained on astrological grounds. Thus, Varāhamihira directs the astrologer to forecast every month details regarding the fluctuation of prices by observing excessive rainfall, meteor, rod, haloes, eclipse, mock-sun

and similar other portents on the *amāvasyā* and *pūrṇimā* as also at the time of the sun's entry into a new sign.⁴⁶⁹ It is also stated that an eclipse in the mid-day causes the sale of corn at a fair price (V.30); an eclipse in the Markaṭa *rāśi*, abnormal rise in the prices of grains; Mars passing through the south of Rohiṇī, fall in prices (VI.10); the rise of Mercury after its conjunction with the sun, an unusual rise and fall in the prices of corn (VII.1); the transit of Mercury through any of the six asterisms beginning with Hasta, rise in prices of oils and other liquid objects (VII.4). It is further observed that in the Pauṣa year of the twelve-year cycle, the corn fetches two or three times its normal price.⁴⁷⁰ Similarly, prices must be expected to go up in the Māgha and Caitra years (VIII.6,8). The upward trend in prices is also said to be caused by Venus overpowering Saturn (XVII.25). The commodities of trade were believed to be presided over by zodiacal signs (Ch.XL). It was believed that profit is ensured if the sun and the moon in various signs are conjoined with and aspected by very friendly planets. It is further stated that the moon conjoined with the sun or in full disc and in conjunction with or aspected by benefics foreshadows increase in the prices of the articles belonging to that sign which is at the time occupied by the moon. Similarly, the sun conjoined with or aspected by malefics brings down the prices of articles belonging to the particular sign (XLI.13-14).⁴⁷¹

This was obviously from the point of view of the traders who were after profit at any cost, and such was certainly the attitude of most of the writers, especially the astrologers, who derived substantial benefits from the rich sections of the society. Had they had common man in mind, the nature of predictions would have undergone a sea change.

Overseas Trade

There is evidence for the existence of India's trade relations with other countries in the Gupta age. As we have seen above, our author refers to water-routes, ships and shipmen (*potaplava*, X.10) and seafaring vessels (*aṇavayāna*, YY, IV.52). He speaks of the seashore overcrowded with ships that have arrived securely laden with precious objects (XLVII.12). Varāhamihira refers to South India as the home of expert mariners (*vāricara*, XIV.14), a position it still retains. India had very close commercial contacts with Ceylon wherefrom she imported pearls (LXXX.2-3). As observed by Cosmas, by virtue of its central position, the island of Ceylon became a great resort of ships from all parts of India, and

from Persia and Ethiopia, and in like manner it sent out many of its own to foreign ports including Male (Malabar Coast), Kalliana (Kalyan) and Sindh. Persian pearls (LXXX.2, 5), which appear to have been very much liked in India in those days, must have been imported through the intermediary of Ceylon. The accounts of Fa-hien, Yuan Chwang and I-tsing testify to the briskness of overland and seaborne trade between India and China and other countries of Asia. The continuance of Indian trade with Rome is attested by the discovery in S. India of a number of Roman coins⁴⁷² and Indian embassies to Justinian in AD 530 and 552. The most important trade ports in India in the 6th century, according to Cosmas, were Sindhu, Orrhotha (Gujarat), Kalliana (Kalyan), Sibor (Chaul), and five ports in Male (Malabar) exporting pepper: Parti, Mangarouth (Mangalore), Salopatana, Nalopatana and Poudopatana, the last three probably situated between Mangalore and Calicut.⁴⁷³

V

JEWEL INDUSTRY

In ancient and mediaeval periods of her history, India formed one of the greatest trading centres for precious stones. Sporadic allusions to gemstones are scattered through the vast mass of literary works, both indigenous and foreign. In course of time, however, entire knowledge pertaining to precious stones was systematised and given the status of a *śāstra* called *ratnaparīkṣā*. It is mentioned by Kauṭilya (*Arthaśāstra*, BK.II.Ch.II) and Vātsyāyana (I.3.16),⁴⁷⁴ the latter including it in his catalogue of sixty-four subsidiary arts. It is not possible to decide when this subject assumed the shape of an independent science. In Varāhamihira and Buddhahatṭa (c. 6th cent. AD), it appears in a considerably developed state. The former refers to *pūrvācāryas* (LXXXI.11) in general and the latter (*Ratnaparīkṣā*, 1.1)⁴⁷⁵ admits that his work is an abridgment of an older *Ratnaśāstra*. In Kauṭilya, on the other hand, it appears to be in a nebulous condition. We may, therefore, assume that the study of this subject was scientifically cultivated in the early centuries of the Christian era.

According to Yaśodhara, *ratnaparīkṣā* treats of the qualities, defects, prices, etc., of jewels (*Ratnam vajra-maṇi-mukt-ādi, teṣāṃ guṇa-doṣa-mūly-ādibhiḥ parīkṣā vyavahār-āṅgam*, Jayamaṅgalā on *Kāmasūtra*, I.3.16). After examining some works, Louis Finot concludes that the *ratnaśāstra* works mainly deal with the following

topics: origin, mines, colour, species, qualities and defects, effects, prices and counterfeits.⁴⁷⁶ The Rantaparīkṣā section of our work is one of the two oldest treatises to treat of these topics, the other being Buddhabhaṭṭa's *Ratnaparīkṣā*.⁴⁷⁷ In subsequent times, Varāhamihira was recognised as an authority on *ratnaśāstra*. Caṇḍeśvara (14th century) refers to Varāha as one of the sources he drew upon in his *Ratnadīpikā*(I.3).⁴⁷⁸

The term *ratna* in Sanskrit has a double sense—precious objects in general, and precious stones in particular. Varāhamihira, therefore, specifies it in the latter sense. "The word *ratna*", states he, "is applicable to elephants, horses, women, etc., on account of the excellence of their intrinsic qualities. Here (for the purpose of the present section), however, it is used for gemstones (*upala-ratna*)⁴⁷⁹ such as a diamond"(LXXIX.2).

Some beliefs about the origin of gems are recorded. Some held that gems originated from the bones of Daitya Bala; according to others, from those of Dadhici; and according to still others, the great variety of jewels is due to the intrinsic qualities of the earth (LXXIX.3).⁴⁸⁰

The classification of gems into *mahāratnas* and *uparatnas*⁴⁷⁸ is ignored by Varāhamihira, who names the following twenty-two stones (LXXIX.4-5):- (1) *vajra*⁴⁸⁰ (diamond), (2) *indranīla*⁴⁸³ (a variety of sapphire), (3) *marakata* (emerald), (4) *karkhetana* (chrysoberyl), (5) *padmarāga* (ruby), (6) *rudhirākhyā*⁴⁸⁴ (carne-
lian), (7) *Vaidūrya* (cat's eye), (8) *pulaka* (garnet), (9) *vimalaka*, (10) *rājamaṇi*, (11) *sphaṭika* (rock-crystal), (12) *śaśikānta* (moonstone), (13) *saugandhika* (a kind of *padmarāga*), (14) *gomedaka* (hyacinth), (15) *śaṅkha* (probably mother of pearls), (16) *mahānīla* (a sort of sapphire), (17) *puṣparāga* (topaz), (18) *brahmamaṇi*, (19) *jyotīrasa*, (20) *sasyaka*, (21) *muktā* (pearl) and (22) *pravāla* (coral). Of these only four are described in detail, viz., diamond, pearl, ruby and emerald, and Finot's view that Varāhamihira's account has come down to us in incomplete form⁴⁸⁵ is quite probable.

The Diamond

The diamond was considered to be the foremost among gems⁴⁸⁶ and practically all the *ratnaśāstra* texts begin with it. The bank of the Veṇā (Wainganga near Nagpur), Kosala, (probably South Kosala), Surāṣṭra (Kathiawad), Śūrparaka (Sopara), Himavat, Mataṅga, Kalinga (the region between the Godāvarī and the

Mahānadi) and Pundra (N.Bengal) are named as findspots of diamonds.⁴⁸⁷ In some of these regions, no diamonds are found at present. It is likely that some ancient diamond-workings have been abandoned leaving no trace whatsoever, and, secondly, as suggested by Finot,⁴⁸⁸ some of the places referred to in the old texts may have been ports of export trade in diamonds. Thus no tangible traces of diamond-mines are to be found in Surāṣṭra and Śūrpāraka, which appear to have been emporia of diamond trade. The Veṇā seems to refer to Wairagadh situated on its bank where diamonds are found in lateritic grits.⁴⁸⁹ Wairagadh appears to have been famous for its diamonds and was consequently known as Vajrākara or Vajragrha.⁴⁹⁰ Kauṭilya evidently has Wairagadh in mind when he refers to Sabhārāṣṭra, which, according to a commentary, is the same as Vidarbha, as a source of diamonds.⁴⁹¹ South Kosala must have comprised diamond-mines of Vindhya Pradesh where diamond-working is still practised. The Vindhya Pradesh diamond-fields "are scattered over an area some 60 miles long by 10 miles wide, across a number of former small states of the Bundelkhand Agency, the most extensive workings being in Panna." In 1906 "there were thirty-six 'principal localities that have yielded diamonds', in six separate states of Bundelkhand."⁴⁹² Kosala may more probably refer to the Sambalpur tract of Orissa where diamonds have been reported till recently. Ptolemy (second century AD) refers to Sambalpur as Sambalake or Sambaraka. He describes the river Manada (Mahanadi) as rising in the country of the Sabarai and avers that diamonds were found in the bed of that river. He also states that diamonds were sent from Sambalaka to other parts of the country. In the bed of the Mahanadi nearabout Sambalpur diamonds were found till comparatively recently. Ball, however, identifies Sambalaka with Sumelpur or Semel on the Koel river in the Palamau district. Gibbon states, on the authority of some Roman records, that Rome was supplied with diamonds from the mine of Sumelpur. The Europeans were aware of the fame of Sambalpur as a findspot of diamonds prior to its occupation by the British. In 1766 Lord Clive sent one Mr. Motte to Sambalpur to purchase diamonds. One Jhara of Sambalpur became Zamindar of Biru in Chhota-Nagpur by selling diamonds to the Raja of Chhota-Nagpur⁴⁹³. Except a few sporadic finds near Simla, no diamond-mines are reported from Himavat.⁴⁹⁴ Mataṅga is the tract between the rivers Kṛishṇā and Godāvārī, i.e., Telingana, and probably refers to the well-known Golconda diamond-mines. As for Kaliṅga,⁴⁹⁵ diamond finds are recorded from the Mahānadi alluvium in the Sambhalpur district of Orissa, in the sands of the Koel river, an affluent of the Son, in the Palamau district, and at Hirakund.⁴⁹⁶

In the seventh century AD Yuan Chwang refers to Kaliṅga as a mart for diamonds which were brought from the interior country, and Mazumdar feels that diamonds were taken to Kaliṅga by the Jharās themselves who collected them at Sambalpur.^{497a} No diamond-working is known in north Bengal^{497b}.

Varāhamihira refers to streams, mines and sporadic places as the three sources of diamonds (*Srotaḥ khaṇiḥ prakīrṇakam*⁴⁹⁸=*ity=ākara-sambhavas=trividhaḥ*, LXXIX.10). The same statement is contained in the *Arthaśāstra* (*Khanis=srotaḥ prakīrṇakam ca yonayah*, II.11). Buddhabhaṭṭa adds the sea, forests and mountains as the sources of precious stones in general (*Payonidhau sariti ca parvate kānane=pi ca*, *Tat tad=ākaratām yātām sthānam=adhyeyagauravāt*, *Ratna-parīkṣā*, I.10).

Each of the above regions is said to yield diamonds of a particular description. Thus a diamond from the bank of the Wainganga, Kosala, Surāṣṭra, Sopara, Himavat, Mataṅga, Kaliṅga and Puṇḍra respectively is described as faultless, coloured like a *śiṛṣa* flower (i.e. slightly yellow), copper-coloured (red), black, slightly red, coloured like a *valla* flower (grey), yellow and blue (LXXIX.6-7).

A diamond with a certain colour and shape was believed to be presided over by a particular deity. Thus an hexangular white diamond is assigned to Indra; one dark and shaped like a serpent's mouth to Yama; one with the colour of a plantain staff, i.e., bluish yellow, and of any shape to Viṣṇu; that coloured like the *karṇikāra* flower and shaped like the female genital organ to Varuṇa; that shaped like the *śṛṅgātaka* fruit, i.e., triangular, and coloured like tiger's eye, i.e., bluish red, to Agni; and that having the form of a barley corn, i.e., stouter in the middle, and of the hue of the red *aśoka* flower to Vāyu (LXXIX.8-10 and comm. Cf. Buddhabhaṭṭa, I.22).

It was customary with the *ratnaśāstrakāras* to assign jewels of different colours to different castes. Our author accordingly ascribes a red and yellow diamond to the Kṣatriyas, white one to the Brāhmaṇas, *śiṛṣa*-coloured to the Vaiśyas and that coloured like a sword, i.e., black, to the Śūdras (LXXIX.11). This caste-wise division is followed even by the Buddhist writer Buddhabhaṭṭa (I.23-6). It is difficult to determine how far these rules were followed in practice; they appear more imaginary than real.

According to the system employed in weighing and pricing the diamond, eight white mustard seeds constituted one *tanḍula* (a grain of rice). The maximum weight mentioned in this connection is 20 *tanḍulas*, each of the following units

being two degrees lower than the preceding one. Although the price of each unit is given (LXXIX.12-13), the coin denomination intended is left unspecified; but Utpala gives the tariff in terms of *kārṣāpaṇas*. Thus the price of a diamond weighing

20	<i>Taṇḍulas</i>	is fixed at	200,000	<i>Kārṣāpaṇas</i>
18	"	"	150,000	"
16	"	"	133,333 $\frac{1}{3}$	"
14	"	"	100,000	"
12	"	"	66,667	"
10	"	"	40,000	"
8	"	"	12,500	"
6	"	"	8,000	"
4	"	"	2,000	"
2	"	"	200	"

An average mustard seed weighs .001 grains; therefore a *taṇḍula*, which is equal to 8 mustard grains=.08 grains. The maximum weight of a diamond mentioned in this connection is 20 *taṇḍulas*, i.e., 16 grains or 4 carats which is indeed very low. Stones of a much higher weight are found even at present when diamond industry is steadily declining. It is impossible to believe that in that heyday of this industry diamonds weighing more than four carats were unknown. The reason behind selecting this weight appears to lie in the fact that twenty *taṇḍulas* constituted the unit *dharāṇa* especially employed in weighing diamonds (*Vimśati-taṇḍulam vajradharāṇam*, *Arthaśāstra*, II.19).⁴⁹⁹

The weight was not the only criterion in determining the price. A diamond fetched more or less price according as it was good or defective. Varāhamihira lays down a general principle according to which the price of a diamond with any of the defects to be noticed shortly decreases by 1/8th (LXXIX.16). Another price-list is to be found in Buddhahatṭa's *Ratnaparīkṣā*, but there the price is given in *rūpakas* and only the highest figure of the two lists, i.e., 2,00,000, agrees with one another, the rest differing widely from each other.⁵⁰⁰ In all likelihood, the leading figure represents the standard price while the succeeding ones are local variations.

Good and bad qualities of diamonds are also briefly enumerated.⁵⁰¹ Thus an ideal diamond, it is stated, should be so hard that it cannot be pierced by any

other substance,⁵⁰² light in weight as compared to its volume and capable of floating on water,⁵⁰³ brilliant, glossy and resembling lightning, fire and rainbow. The diamond that has scratches like crow's legs, flies or hair, is mixed with clay or gravel, broken, double-faceted, burnt, of deformed colour, devoid of lustre, perforated, has bubbles or spots, is truncated on points, flat and unduly elongated like *vāsī* fruit(?) is said to be defective.

A good or bad diamond was believed to have corresponding effects on the person of the wearer. Thus a defective diamond, says Varāhamihira, causes decrease of wearer's kith and kin, wealth and life, while a perfect one brings fear from thunderbolt, enemy and poison to an end and increases prosperity (LXXIX.18).⁵⁰⁴

Diamond was supposed to cause abortion in a pregnant woman.⁵⁰⁵ While some held that a diamond should not be worn by a woman longing for sons, according to others, she could wear a diamond that is shaped like a *śṛṅgāṭaka* fruit, i.e., triangular, trigonal or like a coriander seed or buttocks (LXXIX.17).⁵⁰⁶

The Pearl

The pearl, variously referred to as *muktā* (XII.1; LXXX. 13, 25, 34), *muktāphala* (LXXX.1, 30) and *mauktika* (XXIV.16; XXIX.6; LIII.110), is said to have eight sources: (1) the elephant, (2) serpent, (3) oyster, (4) conch, (5) clouds, (6) bamboo, (7) fish and (8) hog. Buddhabhaṭṭa (II.52-71) also knows all these sources; the *Śukranītisāra* (IV.2.59) omits the elephant; Kauṭilya (*śuktiḥ śaṅkhaḥ prakīrṇakam ca yonayah*, II.11) names only pearl-oysters, conches and sporadic sources. Of these, the pearls derived from the oyster were regarded as the best and were much in use.⁵⁰⁷

The following eight regions are named as the find-spots of pearls: (1) Simhala, (2) Paraloka, (3) Surāṣṭra, (4) Tāmraparṇī river, (5) Pāraśava, (6) Kaubera, (7) Pāṇḍyavāṭaka and (8) Himavat (LXXX.2). Buddhabhaṭṭa⁵⁰⁸ replaces Pāṇḍyavāṭaka by Puṇḍra and omits Pāraśava from his list. Of these, Kauṭilya names only three, the Tāmraparṇī, Pāṇḍyavāṭa and the Himālayas, and adds Pāśīkyā (pearl produced in the river Pāśā), Kauleya (that derived from the river Kūlā near the village of Mayūra in the island of Simhala), Caurṇeya (that obtained from a river near the village Maruchi in the Kerala country), Māhendra (one secured from the Mahendra mountain), Kārdamika (that from the river Kārdama in Persia),

Srautasīya (that which is produced in the river Srotasī), Hrādiya (one produced in a pool of water known as Śrighaṇṭa in a corner of the Barbara sea).⁵⁰⁹ Simhala (Ceylon) has been well-known from very early times for its prosperous pearl industry. Megasthenes⁵¹⁰ (4th century BC) and the author of the *Periplus* (61) (1st century AD) mention large pearls of Ceylon (the former calls it Taprobane and the latter Palaesimundu). The Chinese pilgrim Fa-hien, who visited India and Ceylon in AD 399-414, tells us that the small islands round Ceylon, nearly a hundred in number, produced chiefly pearls and other precious stones and in one of the islands, about ten *li* square, fine pearls called *maṇi* were found. We are further informed that the king of the country sent his men to guard it and if pearls were obtained, he took 3 out of 10. He also refers to 'many precious stones and priceless pearls' hoarded in the treasury of the Buddhist priests.⁵¹¹ Ceylonese pearls are said to be of various shapes, glossy, swan-coloured and large (*Bahusamsthānāḥ snigdhāḥ haṁs-ābhāḥ Simhal-ākarāḥ sthūlāḥ*, LXXX.3). Paraloka is probably identical with the place called Purali in Kerala which is known for its pearl-fishery; Paralia of Ptolemy and of the *Periplus* appears to be a corruption of Paraloka.⁵¹² The pearls from Paraloka are described as dark, white or yellow, mixed with gravel and uneven (*kṛṣṇāḥ śvetāḥ pītāḥ saśarkarāḥ Pāralaukikāḥ viṣamāḥ*, LXXX.4). Surāṣṭra refers to the Gulf of Cambay pearls wherefrom were neither too large nor too small and had the shade of butter (*na sthūlā nāty=alpā navanīta-nibhāś=ca Saurāṣṭrāḥ*, LXXX.4). The river Tāmraparṇī, pearls whereof are said to have been slightly copper-coloured or white and bright (*Iṣat tāmṛāḥ śvetāḥ tamo-viyuktāś=ca Tāmṛākhyāḥ*, LXXX.3), is the same as the Tambaravari or the united course of the Tambaravari and the Chittar in the Tinnevely region which is even now celebrated for its pearl-fishery. The Tāmraparṇī ran through the Pāṇḍya country (Pāṇḍyavāṭa of our author), which formed the southernmost part of the Indian Peninsula comprising modern Tinnevely and Madura districts yielded triangular and minute pearls resembling the *nimba* fruit or coriander seed (*Nimba-phala-triṣṭa-dhānyaka-cūrṇāḥ syuḥ Pāṇḍyavāṭa-bhavāḥ*, LXXX.6). Pearl-fishery is still practised near the harbour of Tuticorn, below Tanjore. The *Periplus* (59) refers to the pearl-fisheries worked by condemned prisoners at the port of Colchi (modern Korkai) belonging to the Pāṇḍya kingdom. It further tells us that at Aragaru (Uraiyur), an important town in the Pāṇḍya country, were bought the pearls gathered on the coast thereabouts. Kālidāsa also knows of the extensive pearl-fisheries practised at the mouth of the Tāmraparṇī and represents the Pāṇḍya king as having presented Raghu with the choicest pearls obtained

therefrom (*Raghuvamśa*, IV.50). Under the name of Mo-lo-ku-t'a this country is mentioned as 'a depot for sea-pearls' by Yuan Chwang.⁵¹³ Pāraśava refers to the Persian Gulf. The Pāraśava pearls are said to be very brilliant, white, very heavy and possessed of highly commendable features (*Jyotiṣmatyaḥ śubhrā guravo=timahāguṇāś=ca Pāraśavāḥ*, LXXX.5). The pearls from the Himalayan region were noted to be light, broken, hued like curds, large and doubly coated (*Laghu jarjaram dadhinibham bṛhad=dviśamsthānam=api Haimam*, LXXX.5). No pearl industry is known to exist now in this tract. Pearls from Kaubera (not identified) were noted for being uneven, black or white, light, brilliant and of good size (*viśamam kṛṣṇa-śvetam laghu Kauberam pramāṇa-tejovat*, LXXX.6).

Like diamonds, pearls with specific colours were assigned to the jurisdiction of different divinities. Thus pearls coloured like a lin flower were believed to be presided over by Viṣṇu; those like the moon, by Indra; those tinged like orpiment, by Varuṇa; black ones, by Yama; those hued like a ripe pomegranate fruit or *guñja*, by Vāyu; and, last, those resembling smokeless fire or lotus, by Agni (LXXX.7-8).

We get a fairly long tariff of prices which are given in two denominations, *kārṣāpaṇa* and *rūpaka*. The weight and the intrinsic merits were taken into consideration while determining the price. The tariff is divided into two parts, (1) one single pearl of different units of weight, and (2) various numbers of pearls weighing a *dharāṇa* (LXXX.9-12, 13-16):-

I. The Weight of a Pearl				The Price	
(1)	4	<i>māṣakas</i>	....	5300	<i>kārṣāpaṇas</i>
(2)	3½	"	....	3200	"
(3)	3	"	....	2000	"
(4)	2½	"	....	1300	"
(5)	2	"	....	800	"
(6)	1½	"	....	153	"
(7)	1	<i>māṣaka</i>	....	135	"
(8)	4	<i>kṛṣṇalas</i>	....	90	"
(9)	3½	"	....	70	"
(10)	3	"	....	50	<i>rūpakas</i>
(11)	2½	"	....	35	"

A similar tariff of prices is contained in Buddhābhaṭṭa's *Ratnaparīkṣā*. While there are certain close similarities, the differences cannot be overlooked; while

Varāhamihira gives prices in terms of *kārṣāpaṇa* and *rūpaka*, Buddhabhaṭṭa gives in *rūpaka* alone; and it is curious to note that in spite of difference in regard to coin denomination, the first five figures are identical in the two lists.⁵¹⁴ It may indicate that *kārṣāpaṇa* and *rūpaka* are used as names of one and the same coin. It is also likely that the figures identical in the two lists give the standard market value while others refer to local variations.

II. Number of Pearls Weighing a Dharāṇa The Price. ⁵¹⁵				
(1)	13	....	325	<i>rūpakas</i>
(2)	16	....	200	"
(3)	20	....	170	"
(4)	25	....	130	"
(5)	30	....	70	"
(6)	40	....	50	"
(7)	55	....	40	"
(8)	80	....	30	"
(9)	100	....	25	"
(10)	200	....	12	"
(11)	300	....	6	"
(12)	400	....	5	"
(13)	500	....	3	"

The groups of one-*dharāṇa* pearls specified above bore certain technical designations useful in day-to-day business transaction. Thus, 13, 16, 20, 25, 30, 40, 55 and 80 or more pearls weighing a *dharāṇa* were called *Pikkā*, *Piccā*, *Arghā*, *Ardhā*, *Ravaka*, *Siktha*, *Nigarā* and *Cūrṇā* respectively (LXXX.17). These appear to have been popular stock-words in use among traders dealing in gemstones. We are told by the scholiast that these words were used in the places where pearls were mined (*etāś=c-ākaraṣṭhāne vyavahārārtham=upayujyante*). The fact that the necessity of coining such nomenclatures was felt shows that brisk trade in pearls was carried on during our period. We come across another list of names in Buddhabhaṭṭa; but none except for *Siktha* (*Sikta* in Buddhabhaṭṭa) agrees with those of Varāhamihira, suggesting the possibility that they refer to practices obtaining in different regions or periods. At the same time it shows the impossibility of one borrowing from the other.

The above tariff, says Varāhamihira, is intended for pearls of good qualities and the prices of intermediate groups are to be found out proportionately. The

value of the inferior sort was to be reduced as follows—The market value of slightly black, white, yellowish, copper-coloured and slightly uneven pearls was fixed at 1/3rd less than that specified above; that of very rough, 1/6th less; and that of yellow ones, a half (LXXX.18-9).

So far about pearls derived from the mother-o'-pearls. Varāhamihira also devotes considerable space to giving an account of the pearls said to be derived from the remaining seven sources. It was believed that in the temples of the elephants belonging to the line of Airāvata born at the moon's conjunction with Puṣya and Śravaṇā synchronous with Sunday or Monday and in those of the Bhadra class of elephants born during the northern course of the sun and at the time of a solar or lunar eclipse are to be found pearls that are plentiful, large, variously shaped and brilliant (LXXX.20-21). The pearls produced in the root of the boar's jaw are said to have the lustre of the moon. Those from the fish are represented as large and as resembling the eyes of the fish (LXXX.23).⁵¹⁶ The cloud-born pearls possessing the brilliance of lightning and produced like hailstones, when falling from the seventh layer of the wind, it is said, are taken away by heavenly beings (LXXX.24). The serpents belonging to the lineage of Takṣaka and Vāsuki and those moving freely were believed to have bright and blue-tinged pearls in their hoods.⁵¹⁷ The mode of testing the genuineness of the serpentine pearls is given thus:—keep the pearl in question in a silver vessel on a blessed spot; if then there is a sudden rain it indicates its genuineness (LXXX.25-6). The pearl originating from the bamboo is described as resembling camphor or crystal, flattened and uneven, whereas that born of the conch is said to be round, brilliant, and lustrous (LXXX.28).

We may be sure that these pearls are imaginary. The cloud-pearl is, as we have seen above, described as taken away by heavenly beings and thus not coming to the earth. The statements that to recognise the above pearls is impossible (LXXX.29) and that their price cannot be estimated (LXXX.22, 27, 29) point to the same conclusion. Fine perforation is regarded as one of the good qualities of a pearl, and Manu (IX.286) goes to the extent of laying down a fine for defective boring of stones. Curiously enough, the piercing of elephantine pearls is forbidden (LXXX.22).

It was customary with ancient Indian writers on medical science as well as on other branches of learning to ascribe certain medical and magical properties to precious stones in general and mythical ones in particular. In keeping with

this tradition, Varāhamihira regards the aforementioned pearls of mythical origin as highly sanctifying (LXXX.22, 23) and of immense value (23, 29) and ascribes to them such magical properties as bestowing sons, victory in war (if the wearer be a king), freedom from disease and grief, good fortune, fame, wealth and other desired objects, and removing the effects of poison and misfortune (LXXX.22, 27, 30).

The Ruby

Although the ruby (*padmarāga*) is the third in the order of treatment, it is well-known that a ruby weighing more than two carats exceeds a diamond of the same weight in value. The ruby is divided into three classes according as its origin lies in *saugandhika* (sulphur), *kuruvinḍa* (cinnabar), and *sphaṭika* (crystal). The characteristics of each of the three varieties are thus described: the ruby originating from sulphur has the lustre of bees, collyrium, lotus or the juice of the rose-apple fruit; that deriving its origin from cinnabar is grey (*śabala*), of dim brilliance, and mixed with mineral substances; and those born of rock-crystal are very brilliant, of many shades and pure.⁵¹⁸ Kauṭilya⁵¹⁹ also mentions *saugandhika* and seems to regard it as the best.

Precious stones in general are said to be good if they are smooth, dazzling with rays, pure, sparkling, heavy, nicely shaped, brilliant within and deep-red; on the contrary, those that are impure, of dim lustre, full of scratches, mingled with mineral substances, broken, ill-perforated, not attractive, and mixed with gravel are said to be defective (LXXXI.3-4). The weight, colour, lustre and other qualities were taken into account while fixing the price of a ruby. We get a table of prices, but the system of currency intended is left unspecified. If Utpala is to be relied upon, Varāhamihira has *rūpaka* in view. Thus a ruby weighing

1	pala	(4 <i>karṣas</i>)	was priced at	26,000	<i>rūpakas</i>
3	<i>karṣas</i>		"	20,000	"
½	pala	(2 <i>karṣas</i>)	"	12,000	"
1	<i>karṣa</i>		"	6,000	"
8	<i>māṣakas</i>	(½ <i>karsa</i>)	"	3,000	"
4	"		"	1,000	"
2	"		"	500	"

The price of rubies with intermediate weights was fixed proportionately, taking into account their superior or inferior qualities. A ruby defective in colour, for

instance, fetched only half the price specified above; that deficient in lustre, only 1/8th; that with few good qualities and many defects, 1/20th; and, that which is smoky, has many holes and fewer good characteristics, 1/200th (LXXXI. 7-11).⁵²⁰

The Emerald

Only one chapter consisting of a single stanza is allotted to the emerald. Emeralds tinged like a parrot's wings and bamboo leaves (green), plantain tree (greyish-yellow), and a *śirīṣa* flower (slightly yellow) are referred to. An emerald possessing good qualities is recommended for use while propitiating gods and manes (LXXXII.1; also mentioned in LIII.46).

Other Stones

We have very scanty information about other stones. *Śaśikānta* and *mahānīla* are merely varieties of rock-crystal and sapphire respectively. *Vimalaka*, *rājamaṇi*, *brahmamaṇi*, *jyotīrasa*, *sasyaka* and *śaṅkha* are not named in any other contemporary work and cannot be certainly identified. The *Cullavagga* (IX.iii.1) refers to *jyotīrasa* and *śaṅkha*. *Vimalaka* is represented as having yellow shade (V.57; YY, VI.18). *Sasyaka* is said to be blue and is compared with Mercury (VII.20 & comm.). This is probably another name for the emerald.⁵²¹ S.M. Tagore regards *jyotīrasa* as identical with jasper or heliotrope.⁵²² Kauṭilya⁵²³ speaks of *vimalaka*, *sasyaka* and *jyotīrasa* as varieties of inferior gems. Elsewhere he mentions the first two as *rūpyadhātus*.⁵²⁴ Crystal is specially noted for its clarity, is compared with the moon, Jupiter and Canopus, and said to be found in the ocean (IV.30; VIII.53; XII.20, 5; LIII.110). *Vaidūrya* is specified for its lustre (X.21; XXVIII.3; XXIX.8; XLII.33), and Utpala describes it as bluish-yellow (*nīla-pīta*).⁵²⁵ *Sphaṭika*,⁵²⁶ *śukti*, *śaṅkha*⁵²⁷, *vidrūma*,⁵²⁸ *vaidūrya*⁵²⁹ and other jewels⁵³⁰ are said to be found in the sea. Pearls, *śaṅkha* and *vaidūrya* are said to have been mined in the south.⁵³¹ We have a vague reference to a green stone (*harita-maṇi*, CIII.61), but without any specification. Another stone called *susāra* is also mentioned (LXXXVI.23), but there is nothing to indicate its identity.

The foregoing pages will have made it abundantly clear that Varāhamihira furnishes us with very valuable information on the prosperous condition of jewel industry in the Gupta period and that in regard to many important details it is borne out by reliable external evidence. The value of this information is all

the more enhanced by the fact that the *Bṛhat-saṃhita* is the oldest datable work to deal with this subject. No writer on the history of the *ratnaśāstra*, therefore, can ignore the valuable evidence analysed above.

VI

WEIGHTS AND MEASUREMENTS

The system of weights and measurements in India differed from region to region. In a stanza from the *Samāsa-saṃhitā* quoted by Utpala on XXIII.2, mention is made of *Māgadhamāna*. Another standard system originated in Kalinga and was known as *Kāliṅga*. Both these systems are known to Caraka (Kalpasthana, XII.105) who regards the former as superior to the latter.

Tulā

We get an interesting account of the weighing balance (*tulā*) in XXVI.6,9, according to which both the scale-pans (*śikya*, *śikyaka*) measuring six *aṅgulas* in diameter were fashioned from linen cloth; each of them was connected with the balancing rod (*tulā*) by means of four strigs (*sūtra*), 10 *aṅgulas* in length; a cord (*kakṣyā*), 6 *aṅgulas* in length, held the rod between the two scales; the rod, 12 *aṅgulas* long, was made of gold, silver, *khadira* wood or a shaft which had wounded a man. Though this balance is described in connection with a quasi-religious ritual, it will not be wrong to assume that similar balances were used in ordinary business transactions as well.

Weights

Varāhamihira refers to gravitational (*tulāmāna*) as well as cubic (*parimāṇa*) measures. The following weights are specified—

1. *Taṇḍula*=8 white mustard seeds (*sitasarṣap-āṣṭakam taṇḍulo bhavet*, LXXIX. 12). According to the table of weights given in *Caraka* (Kalpasthāna, XII 87-88), 6 particles (*dhvaṃśis*)=1 *maṛīci*, 6 *maṛīcis*=1 *rakta-sarṣapa* (rape seed), 8 *sarsapas*=1 *taṇḍula*. It was used in weighing precious stones like diamonds.

2. *Kṛṣṇala* (LXXX. 11), *Guñjā* (LXXX. 12-13). The barberry seed served as the unit of weight for precious metals and stones. Probably there were two systems of weight current in different parts of the country, one based on *sarṣapa* and the

other on *kṛṣṇala*; but sometimes they were used together in the same region. Fractions of *guṇjā* were also in use (Cf. 3 1/2 *guṇjās*, LXXX. 11, 2 1/2 *guṇjās*, LXXX. 12).

3. *Māṣaka* (LXXX.9, 10; LXXXI.8-9). According to the *Caraka* table, 2 *tanḍulas* = 1 *dhānya-māṣa*, 2 *māṣas* = 1 *yava*, 4 *yavas* = 1 *aṇḍikā*, 4 *aṇḍikās* = 1 *māṣaka*; thus 32 *dhānyamāṣas* make one *māṣaka* (kalpa, XII.87-88). A different table is found in the *Kauṭīliya* (II.19), which regards 10 *dhānyamāṣas* or 5 *guṇjās* as equal to 1 *suvarṇa-māṣaka*. According to Amara (II.9.85) also, 5 *guṇjās* make 1 *māṣaka* (Cf. *Manu*, VIII.134). A silver *māṣaka*, however, was equal to two *guṇjās*.

4. *Karṣa* (LXXXI.7, 8). In the *Kauṭīliya* (II.19) and Amara (II.9.87), 16 *māṣakas* = 1 *karṣa*. According to *Caraka*, 3 *māṣas* = 1 *śāṇa*, 2 *śāṇas* = 1 *drakṣaṇa*, 2 *drakṣaṇas* = 1 *karṣa*, i.e., 12 *māṣas* = 1 *karṣa*. It was employed in weighing precious stones and metals.

5. *Pala* (LXXXI.7) = 4 *karṣas*.⁵³² Men weighing 1600 or 1000 *palas* (LXVIII.25, 29) and a ruby weighing half a *pala* (LXXXI.8) are mentioned.

6. *Dharaṇa*. Varāhamihira specifies *dharaṇa* as 1/10th of a *pala* (*pala-daśabhāgo dharaṇam*, LXXX.13).⁵³³ Different *dharaṇa* units were in use for different articles. *Kauṭīliya*, for instance, takes 88 white mustard seeds to be equal to one *rūpya-māṣaka* and 16 *rūpya-māṣakas* to form 1 silver *dharaṇa*, whereas 20 *tanḍulas* constitute a *vajra-dharaṇa*.⁵³⁴ Varāhamihira gives prices of diamonds weighing 20 *tanḍulas* and below.

7. *Tulā* (LIV.17) = 100 *palas* (*Caraka*, Kalpa, XII.97; Amara, 11.9.87).

8. *Bhāra* = 20 *tulās* or 2000 *palas*.⁵³⁵ According to *Caraka*, however, 4 *palas* = 1 *kuḍava*, 4 *kuḍavas* = 1 *prastha*, 8 *prasthas* = 1 *kaṁsa*, 4 *kaṁsas* = 1 *droṇa*, 2 *droṇas* = 1 *śūrpa*, 2 *śūrpas* = 1 *bhāra*, i.e. 2048 *palas* = 1 *bhāra*. Men weighing half a *bhāra* (*bhārārdha*), 1 *bhāra* and 1½ *bhāras* are referred to (LXVII. 106; LXVIII.18).

These weights may be given in a tabular form as follows:-

8 <i>Sita-sarṣapas</i>	= 1 <i>Tanḍula</i>
5 <i>Kṛṣṇalas</i>	= 1 <i>Māṣaka</i>
16 <i>Māṣakas</i>	= 1 <i>Karṣa</i>
4 <i>Karṣas</i>	= 1 <i>Pala</i>
1/10 <i>Pala</i>	= 1 <i>Dharaṇa</i>
100 <i>Palas</i>	= 1 <i>Tulā</i>
20 <i>Tulās</i> or 2000 <i>Palas</i>	= 1 <i>Bhāra</i>

Measurements of Capacity

Cubic measures were used alongside for measuring grains and liquid substances like water. We have references to the following measures of capacity:-

1. *Pala* (XXIII.2). It was probably the smallest unit of cubic measures and was adopted from the weight specified above.

2. *Kuḍava* (CIII. 46). It is equal to 4 *palas*.⁵³⁶ But as will be presently shown, for measuring water, it was probably counted as equal to $3\frac{1}{8}$ *palas*.

3. *Prastha* (LIV.17). 4 *kuḍavas* or 16 *palas* make 1 *prastha*.⁵³⁷

4. *Āḍhaka* (LIV.17). 4 *prasthas* or 64 *palas* constitute 1 ordinary *āḍhaka*. But while measuring rain-water an *āḍhaka* consisting of 50 *palas* was used (XXIII.2). Varāhamihira himself distinguishes the *āḍhaka* used in measuring water from the ordinary one. Thus in connection with the selection of a house-site, we are asked to dig a pit, fill the dug out earth in a water-*āḍhaka*, and to weigh the same; if one water-*āḍhaka*-full of earth weighs 64 *palas*, the site is suitable.⁵³⁸ As stated by Varāhamihira himself, this was based on *Māgadha-māna*.⁵³⁹ It is confirmed by Kauṭilya, who states that the *droṇa* measure of state revenue is equal to 200 *palas* and that *āḍhaka* is $\frac{1}{4}$ th of it. This shows that whereas the ordinary *āḍhaka* (probably according to the *Kāliṅga-māna*) consists of 64 *palas*, in the *Māgadha-māna* it is 50 *palas*.

5. *Droṇa* (XXI.32, 34; XXIII.6-9; LIV.17; LVI.2). It consists of 4 *āḍhakas*, i.e. 256 *palas*=ordinary *droṇa*=200 *palas*=*Māgadha droṇa* employed in measuring water. *Droṇa* varied according to its use also. Thus Kauṭilya mentions *droṇa* measures constituted by 200, 187½, 175 and 162½ *palas*.

Ordinary Measures		Māgadha measures	
4 <i>palas</i>	= 1 <i>Kuḍava</i>	$3\frac{1}{8}$ <i>Palas</i>	= 1 <i>Kuḍava</i>
4 <i>Kuḍavas</i> (16 <i>Palas</i>)	= 1 <i>Prastha</i>	4 <i>Kuḍavas</i> (12½ <i>Palas</i>)	= 1 <i>Prastha</i>
4 <i>Prasthas</i> (64 <i>Palas</i>)	= 1 <i>Āḍhaka</i>	4 <i>Prasthas</i> (50 <i>Palas</i>)	= 1 <i>Āḍhaka</i>
4 <i>Āḍhakas</i>	= 1 <i>Droṇa</i>	4 <i>Āḍhakas</i> (200 <i>Palas</i>)	= 1 <i>Droṇa</i>

Lineal Measures (*Pramāṇa*)

Varāhamihira mentions the following lineal measures:

1. *Āṅgula*. It is stated that the minutest particle of dust seen when the sun passes through the interstices of a window is called *paramāṇu* and is the first of the lineal measures. In the table given by our author, 8 *paramāṇus*=1 *rajas* (a particle of dust), 8 *rajas* - 1 *vālāgra* (hair-edge), 8 *vālāgras* - 1 *likṣā* (nit), 8 *likṣās* - 1 *yūkā* (louse), 8 *yūkās*=1 barley-corn, 8 barley-corns=1 *āṅgula*.⁵⁴⁰ This is the smallest practical measure and is roughly equal to $\frac{3}{4}$ th of an English inch. Various kinds of *āṅgulas* were in use. Thus according to a stanza of Viśvakarman cited by Utpala, 8 *yavas* = largest *āṅgula*, 7 *yavas*=middling *āṅgula*, 6 *yavas*=lowest *āṅgula* measure.⁵⁴¹ Varāhamihira defines a practical digit (*karmāṅgula*) as the space covered by eight husked barley corns placed breadth-wise touching each other.⁵⁴²

2. *Vitasti* (XXVI.9). According to the table given in the *Arthaśāstra*, 12 *āṅgulas* = 1 *vitasti*.⁵⁴³

3. *Aratni* (LXXI.3) In Kauṭilya's table, 2 *vitastis* or 24 *āṅgulas*=1 *aratni* or a *Prājāpatya hasta*. But Utpala takes it to be a smaller cubit with the fist closed (*aratniḥ kṛtamusṭhi-hastah, kaniṣṭhāsama iti kecit*).

4. *Hasta* (XXIII.2; XXXIII.6, 7; XLIII.3; LII.4 ff., etc.)=24 *āṅgulas*. Various kinds of *hastas* were in use. Kauṭilya informs us that a *hasta* of 54 *āṅgulas* was employed in measuring forests and that of 28 *āṅgulas* in measuring pastures. Utpala mentions three kinds of *hasta* measure: the *hasta* constituted by 24 *āṅgulas* of eight barley grains was called *Prasāya*; of seven, *Sādhāraṇa*; and of six, *Śama*. This last is mentioned in LII.19, but the commentator states that it is used here without any technical sense and that the *hasta* made up by 24 *āṅgulas* of eight barley corns is intended.⁵⁴⁴

5. *Daṇḍa* (XXIV.9). In the *Arthaśāstra* table, 1 *daṇḍa*=4 *aratnis* or *hastas*.^{544a} But while commenting on LXXII.3, Utpala equates *daṇḍa* with six *hastas* and *daṇḍārdha* with three (*daṇḍam śaddhasta-pramāṇam tad=ardha-vistṛtam hasta-traya-vistṛtam*).

6. *Dhanuṣ* (XXXIII.6), the same as *daṇḍa*.

7. *Puruṣa*. Varāhamihira employs the *puruṣa* measure to denote the length

(XXXIII.8) and depth (LIII.6ff). Kauṭilya knows the *puruṣa* measure to be of three kinds:- (i) 84 *aṅgulas*=1 *vyāma* or *khāta-puruṣa*, meant for measuring ropes or moats; (ii) 96 *aṅgulas* or 4 *aratnis*=1 *puruṣa*; (iii) 108 *aṅgulas* = 1 *puruṣa*, for measuring sacrificial altars.⁵⁴⁵ Utpala takes the *puruṣa* measure mentioned in XXXIII.8 as equivalent to the first (*hasta-trayaṁ sārddham*). He further informs us that in LIII. 6ff. it denotes the height of a man with raised arms, i.e. 120 *aṅgulas* or 7½' (*Puruṣa-śabden-ātr-ordhva-bāhuḥ puruṣo jñeyah sa ca vimśaty-adhikam=aṅgulaśataṁ bhavat-iti sarvatra paribhāṣā*).

8. *Yojana* (XXI.3; XXIII.4; XXX.32-33; XXXII.28). According to the *Arthaśāstra*, 1000 *dhanuṣ* (4000 *hastas*)=1 *goruta* x 4=16000 *hastas* or 8000 yards = 1 *yojana*, corresponding to 4.54 English miles. A bigger *yojana* is named in a verse from Puliśa cited by Utpala: 4000 *hastas* or 2000 yards 1 *krośa* x 8=32000 *hastas* or 16000 yards = 1 *yojana*, or 9.99 English miles.⁵⁴⁶

These measures are given in a tabular form below:-

A smallest particle of dust	= 1 <i>Paramāṇu</i>	
8 <i>Paramāṇus</i>	= 1 <i>Rajas</i>	
8 <i>Rajas</i>	= 1 <i>Vālāgra</i>	
8 <i>Vālāgras</i>	= 1 <i>Likṣā</i>	
8 <i>Likṣā</i>	= 1 <i>Yūkā</i>	
8 <i>Yūkās</i>	= 1 <i>Yava</i>	
8 <i>Yavas</i>	= 1 <i>Aṅgula</i>	= ¾"
8 Husked barley grains placed breadthwise	= 1 <i>Karmāṅgula</i>	
12 <i>Aṅgulas</i>	= 1 <i>Vitasti</i>	= 9"
24 <i>Aṅgulas</i>	= 1 <i>Hasta, Sama, Aratni</i>	= 1½'
4 or 6 <i>hastas</i>	= 1 <i>Daṇḍa</i>	= 6' or 9'
4 <i>Hastas</i>	= 1 <i>Dhanuṣ</i>	= 6'
3½ or 5 <i>Hastas</i>	= 1 <i>Puruṣa</i>	= 5¼' or 7½'
16000 or 32000 <i>Hastas</i>	= 1 <i>Yojana</i>	= 4.54 or 9.99 English miles.

VII COINAGE

As we have seen above,⁵⁴⁷ Varāhamihira refers to the coin denominations, *kārṣāpaṇa* and *rūpaka*, while giving the tariff of prices of precious stones. A glance at the first table laying down the prices of a pearl of different weights⁵⁴⁸ would lead us to conclude that *kārṣāpaṇa* and *rūpaka* are used by Varāhamihira as two different names of one and the same coin. While the prices of pearls weighing from 4 *māṣakas* to 3½ *rattis* (*kṛṣṇalas*) are specified in terms of *kārṣāpaṇa*, those of pearls weighing 3 and 2½ *rattis* are given in *rūpakas*. The prices, like the weights of pearls, are clearly in the descending order. The price of a pearl weighing 3½ *kṛṣṇalas* is stated to be 70 *kārṣāpaṇas*; this is immediately followed by the statement that a pearl weighing 3 *kṛṣṇalas* fetches 50 *rūpakas* by way of its price, indicating thereby that in Varāhamihira's time *rūpaka* and *kārṣāpaṇa* were treated as synonyms. This inference finds support from a comparative study of the tables of prices given by Varāhamihira and Buddhahatṭa also. Thus, if Utpala is to be relied upon, Varāhamihira gives prices of diamonds of different weights in *kārṣāpaṇas*, while Buddhahatṭa states the price in terms of *rūpaka*; and yet the highest figure in the two lists is identical: 200,000 *kārṣāpaṇas*, according to Varāhamihira, and the same amount of *rūpakas* according to Buddhahatṭa. Similarly, prices of a pearl of weights varying from 4 *māṣakas* to 3½ *kṛṣṇalas* are given in *kārṣāpaṇas* by Varāhamihira and in *rūpakas* by Buddhahatṭa and yet the first five figures in the two lists are the same. This leaves absolutely no doubt about the synonymy of the words *rūpaka* and *kārṣāpaṇa*.

What are we to understand by *rūpakas* and *kārṣāpaṇa* in the present context? According to an unnamed authority cited by Utpala (on LXXIX. 12-13), 20 cowrie shells=1 *kākinī*, 4 *kākinīs*=1 *paṇa*; 4 *paṇas*=1 *caturtha*; 4 *caturtha(ka)s*=1 *purāṇa*, also called *kārṣāpaṇa*. According to this table, 1 *purāṇa* or *kārṣāpaṇa*, viz., a silver *pāṇa*, was equal to 16 copper *paṇas* or 1280 cowrie shells. But sometimes *purāṇa* or *kārṣāpaṇa* was regarded as equal to 20 *pāṇas* (of copper). In some areas this appears to have been the standard equation as revealed by a perusal of the sentence introducing these verses.⁵⁴⁹ This equation would mean that sometimes the *kārṣāpaṇa* was believed to have comprised 1600 cowrie shells. Now, according to Manu, a silver coin, 16 *raupya-māṣakas* or 32 *rattis* in weight, was known as *purāṇa*.⁵⁵⁰ And there is evidence to believe that the enormous numbers of silver

punch-marked coins that were struck to the standard of 32 *rattis* or about 56 grains were actually known by the names *kārṣāpaṇa* and *purāṇa*. Later, in the early centuries of the Christian era when the Śaka Kṣatrapas of Western India issued silver coins on the pattern of the hemidrachms of the Indo-Greek rulers, they were also known as *kārṣāpaṇa* as has been amply demonstrated by Rapson.⁵⁵¹ After the Śakas were defeated by the Gupta emperor Candragupta II Vikramāditya, the latter and his successors struck silver coins of the same weight as those of the Kṣatrapas for circulation in the newly conquered territory. Afterwards, when the usefulness of silver coins was realised, the successors of Candragupta II struck silver coins of the same weight for circulation in the Middle Country (Madhyadeśa) also. These coins were known as *rūpakas* as we learn from the Baigram copper-plate inscription of the Gupta year 128 (AD 448) which gives the ratio between the Gupta gold and silver coins as 1:16.⁵⁵² The silver coins of the Kalacuri king Kṛṣṇarāja (*circa* AD 550-575), struck on the pattern of the silver currency of the Guptas,⁵⁵³ also went by the denomination of *rūpaka*.⁵⁵⁴ This would leave the impression that the older denomination of *kārṣāpaṇa* was completely replaced by *rūpaka*, and it has been accordingly suggested that the former denomination gave place to the latter.⁵⁵⁵ It is indeed a fact that the word *kārṣāpaṇa* in the sense of a silver coin is of rare occurrence in later inscriptions. But the *Bṛhat-Saṃhitā* evidence leaves no doubt whatsoever that the word *kārṣāpaṇa* continued to be used for silver coins even in the post-Gupta period. The currency of the word in this sense as late as the 9th century AD seems to be indicated by Utpala's commentary.

We have no means to determine the silver currency that Varāhamihira had in view while referring to *rūpakas* and *kārṣāpaṇa*. Most probably he had before him late Gupta silver coins. But there is another possibility also. Varāhamihira was a resident of Avanti,⁵⁵⁶ and, according to a statement of Āmarāja, he died in Śaka 509 (AD 587).⁵⁵⁷ After the first quarter of the sixth century AD the Avanti region including Ujjayinī had come under the possession of the Early Kalacuris of Māhiṣmatī. Of them at least one, Kṛṣṇarāja, who seems to have flourished in the third quarter of the sixth century, is known to have issued silver coins which came to be known after his own name as *Kṛṣṇarāja-rūpakas*.⁵⁵⁸ It is not impossible, therefore, that Varāhamihira had the silver coins of the Kalacuris in view.

The great popularity of the silver coins in Western India is evident from the

fact that in the tabulation of the prices of diamonds Varāhamihira refers to them (i.e. silver coins) merely by mentioning figures, the coin denomination being left unnamed as it was commonly known to the people. It was a common practice in ancient India to refer to the most common denomination merely by citing amounts, the knowledgeability of the denomination being taken for granted. Thus, Pāṇini refers to articles purchased with 100, 1000, 1500 and 2000 without specifying the name of the coins. In all these cases silver *kārṣāpaṇa* is meant as being the standard coin of his time. Similar references are found in the Jātakas, Kauṭilya's *Arthaśāstra* and Patañjali's *Mahābhāṣya*.⁵⁵⁹

Incidentally, it may be pointed out that the *Bṛhat-saṃhitā* contains the earliest datable literary reference to the *rūpaka*.⁵⁶⁰

Notes and References

1. XV.9, 10; XXXIII.9; XLV.62; LVII.36; LXVIII.17; LXIX.2; LXXXV.46.
2. Seeds should be sown when the moon passes through any of the four fixed (*dhruva*) asterisms, i.e. Uttarāṣādhā, Uttarabhadrapadā, Uttaraṣāḍgunī, Rohiṇī (XCVII.6), and in the *karāṇa* called Gara (XCIX.4). It was believed that seeds sown at the time of the moon's passage through the south of Jyēṣṭhā, Mūla, Pūrva, and Uttarāṣādhā would perish (IV.5) which implies that sowing was undertaken during the moon's passage through the north of these asterisms.
3. VIII.12-13.
4. XXXIX.14 (*saṅgraha-kāla*).
5. XV.4, 7, 11, 27; XVI.4; XL.4
6. *Prāvṛṭkālasya c-ānnam āyattam*, XXI.1. Also cf. XIX.2.
7. Vide my paper "Textual Evidence bearing on Rainfall in Ancient India", *JOI*, IX (1960), pp.407-18; Appendix IV of this work.
8. VIII.13. Elsewhere '*aparāsasya*' and *pūrvāsasya* are referred to as *pūrvajāta* and *paścādupta* respectively, for *pūrvāsasya* is sown after *aparāsasya* is harvested (XXXIX.9). These also correspond with the *pūrvavāpa* and *paścādvāpa* of the *Arthaśāstra* which also knows an intermediary crop called *madhyavāpa*. *Pūrvavāpa*, according to Kauṭilya, includes all the crops that are sown at the commencement of the rainy season, e.g., paddy, *kodrava*, sesamum, *priyaṅgu*, *dāraka* and *varaka*; *madhyavāpa* comprises green gram, black gram and *śaibya* which are cultivated in the middle of the same season; *kusumbha*, *masūra*, *kulattha*, barley, pea, linseed and mustard which are sown in autumn came under the category of *paścādvāpa*, cf. *Arthaśāstra*, II.24.p.116. The *Pārājika* (ed. Jagadish Kashyap, Nalanda, 1958, p.51) refers to fields where *pūrvānna* and *aparānna* were grown: *khettaṃ nāma*

yattha pubbaṇṇaṃ vā aparāṇṇaṃ vā jāyati. Cited by G.S.P. Misra, *The Age of Vinaya*, New Delhi, 1972, p.244, fn.30. But in the text, however, he takes this passage as simply referring to the fields where grains or pulses are produced. In the *Pārājika* (p.61) both *pūrvāṇṇa* and *aparāṇṇa* are spoken of as green and meant for the enjoyment by human beings: *haritaṃ nāma pubbaṇṇaṃ aparāṇṇaṃ yaṃ manussānaṃ upabhoga-paribhogaṃ ropimaṃ*.

9. V.21, 27, 78, 90; X.18; XXV.2; XXVII.2 (spurious); XXXIX.1, 12, 14; XL.3; IX.42; XV.15; XCIV.4; CIII.63.
10. CIII.47; IX.43; XXV.2; XXXIX.1, 13; XL.2; XLI.3. The word *grīṣma* is somewhat loosely employed, for barley, wheat, etc. are actually harvested in spring and not in summer.
11. Ch.XXXIX: A vernal crop (*vāsanta sasya*) is also mentioned, (XXVII.2); but the chapter in which it occurs is spurious. S.K. Maity is certainly wrong in inferring from VIII.12 and VIII.8-9 that certain crops were duly ripened in Śrāvaṇa and Caitra or Vaiśākha (*Economic Life of Northern India in the Gupta Age*, p.79, fn.8 & 10), for the verses in question do not refer to months, but to the years of Jovian cycle denoted by those names. Similarly, he takes the term *sārada* in V.78, 90 to mean the grain sown in autumn (*ibid.*, p.79, fn.9), which is not correct. The word is invariably used by Varāhamihira in the sense of corn ripening in autumn and the commentator so understands it everywhere.
12. *Caraka*, Sūtrasthāna XXVII.8 ff. Cf. *Amarakoṣa*, II.9.24 and the verse from the *Ratnakoṣa* enumerating *śamī-dhānyas* cited by Bhānuji Dikṣita on the above.
13. The legume (*nāla*) of sesamum is referred to in LIII.115. Cf. *Utpala-tilānām nālaṃ yasminnabhyantare tilā bhavanti*.
14. V.39; VIII.30; XIX.16.
15. V.39; VIII.30; XV.6; XVI.7; XIX.6, 16; XL.3; L.30; *BY*, IV.23-27.
16. Monier Williams, *Sanskrit-English Dictionary*, under *Kalamaśālī*.
17. Utpala invariably renders these phrases by *kalama-śāly=ādi*. Also cf. *Caraka*, I.27.8, II; *Suśruta*, I.46.4.
18. Also mentioned by Pāṇini and *Caraka* (I.27.12).
19. *On Yuan Chwang*, I.p.300.
20. Monier Williams, *Sanskrit-English Dictionary*.
21. *Caraka*, Sūtra, XXVII.8, 11. In *Suśruta*, it is named *lohitaśālī* and *lohitaka* (LXLVI.4, 6).
22. Cf. *Caraka* I.XXVII.8; *Suśruta* I.XLVI.4.
23. Cf. *Caraka* I.XXVII.8.
24. Utpala on XL.5: *Śālaya iti kecit, śimbidhānyam=iti kecit, anuṭpannāni yāni punar=jāyante te niṣpāvāh*.

25. Monier Williams (*Dictionary*, p.563) regards it as *Dolichos Sinensis*, or a species of pulse, perhaps *Dolichos Lablab*.
26. XV.6; XVI.7; XIX.6; XXIX.4; XL.2, 3, 5; XLV.33.
27. VIII.30; XV.6; XVI.7; XIX.6; XL.2, 3; XXIX.4; LXIX.2; LXXIX.10; LXXXVI.4; XLIII.11; XLV.33; LXII.2; BY, XVIII.6.
28. XXIX.6; XL.4; LXXXVI.2. *Kodrava* is called *kodau* in Hindi.
29. VIII.10; XXIX.4.
30. BY, IV.23-4.
31. *Kṣudradhānya*, XXXIV.15. Comm. *Kṣudradhānyānām priyaṅgu=ādīnām*.
32. XV.14; XVI.36; XXV.2; XXIX.4; XL.5; LXXV.8; LXXVIII.3; XCIV.21, L.34; LXXXVI.22; BY, IV.23-4.
33. XL.2
34. XXIX.5; LIII.36, 114; LXXXVI.22; XCIV.21; XL.5; BY.IV. 23-27.
35. XL.5.
36. XXIX.5; XV.14; XVI.3; BY,XVIII.3-5.
37. V.75; XV.14; XVI.36; XXV.2; XXIX.4; XL.6; L.31; XLVII.30, 35, 77; LIV.2, 7, 17; LXIV.6; LXXV.7.
38. XXIX.5; XL.5; LXXXVI.4; XLV.24.
39. XLIII.5; XLVII.35.
40. LXXIX.12.
41. V.75; XV.9, 14; XXIX.5; XL.3; XCIV.15.
42. XXIX.6. Here the word employed is *śaṇa*. Another word for it, viz., *bhaṅgā*, is suggested to be translated as canvas, and it is averred that 'the inner bark of the plant yields strong fibre, fit for strings and ropes, and a coarse cloth, canvas, is woven' (J.C.Ray in *IHQ*, XV, p.197.)
43. XXIX.6; XL.5; LXXX.7. *Atasī* flower with its dark shade is mentioned in LVII.32 and fruit in LVI.3.
44. XXIX.13; XL.6, 7; XLII.57; CIII.61, 63.
45. *Niṣpanna-śāl-ikṣu-yav-ādi-sasyām*, VIII.30; *śāl-ikṣumaty=api dharā*, XIX.16.
46. Cf. *Raghuvamśa*, IV.20, which refers to women sitting under sugarcane plants and watching rice-fields.
47. III.5; IV.9, 11, 16, 18, 19, 20; 4 V.20, 21, 22, 30, 53, 55, 57, 69, 70, 75, 78, 79, 80, 83, 85, 87, 89, 96; VI.3-4; VII.4.14; VIII.5, 6, 9, 11, 13, 14, 15, 30, 34, 36, 44, 50, 52; IX.8, 10, 12, 16, 20; XI.8, 14, 29, 37, 38, 43, 44, 45, 46, 47-36, 44, 50, 52; IX.8, 10, 12, 16, 20; XI.8, 14, 29, 37, 38, 43, 44, 45, 46, 47-36, 44, 50, 52; XII.20; XVIII.25; XXIX.12; XXXII.26; XXXIII.10; XXXIV.4; XXXVII.1; 48, 49, 50; XII.20; XVIII.25; XXIX.12; XXXII.26; XXXIII.10; XXXIV.4; XXXVII.1; XLVI.4; LVII.49; LXXXVIII.10; XCIV.2,4,6; XXI.14, 15,16; XXIV.20, 23, 24, 33,

- 36; XXV.2, 5; XXVII.1-2, 6-7.
48. The following are the references to famine or defective crops: III.6, 13, 16-17, 19, 31; IV.5, 14, 16, 18-21, 23, 27, 29; V.21, 23-4, 27, 38-9, 52, 54, 56, 61, 71, 73, 76, 82, 88, 90, 92, 95; VI.9; VII.3, 7, 18; VIII.4, 10, 16, 19, 28, 40, 44; IX.14, 18, 23, 26, 41; X.2, 11, 20; XI.13, 30, 31, 32, 36; XII.18, 21; XVII.4, 5, 17, 18; XIX.1, 8, 19; XX.1, 2; XXIV.23, 30; XXVII.5; XXIX.11; XXX.13, 30; XXXI.1; XXXII.10, 25; XXXIII.12; XXXIV.12, 14-15, 16; XXXV.4-5; XXXVIII.4; XXXIX.8-10, XLV.27-28, 38, 42, 44; XLVI.4, 13, 16; LVII.50; LXXVIII.24; LXXXV.65; XCIV.2, 7, 8, 11.
49. III.16; XIX.20-21; XLV.38 (*Durbhikṣam anāvṛṣṭau*).
50. Yāska, *Nirukta*, I.2, 3, 10; *R̥gveda*, VIII.5-12.
51. *Cambridge History of India*, Vol.I, p.147. For other references to 12-year famine, see *VIJ*, III (i), pp.93-98. Also see R. Ganguli, "Famine in Ancient India," *ABORI*, XV, pp.176-96.
52. The following stanza cited by Utpala on V.52 defines *it* as
 अतिवृष्टिरनावृष्टिर्मूषकाः शलभाः शुकाः।
 अत्यासन्नाश्च राजानः षडेता ईतयः स्मृताः॥
53. V.52, 54; VIII.28, 40, 44; XX IV.33; XLV.42.
54. J. Mc Crindle, *Megasthenes and Arrian*, p.84.
55. For references, *vide* notes 47 and 48 above.
56. The summer crop would thrive if (i) at the time of the sun's entry into Vṛścika the *Kendras* (4th, 7th and 10th houses) from him are occupied by benefics (Mercury, Venus and Jupiter), or the sun is aspected by or is in conjunction with strong benefics; (ii) the sun is posited in Vṛścika, and the Jupiter and the moon in Kumbha or Simha, or *vice versa*; (iii) Venus or Mercury or both are posited in the 2nd house from the sun situated in Vṛścika; or when the sun in Vṛścika is aspected by Jupiter; (iv) the sun is posited in Vṛścika and the 2nd and 12th houses from the sun are occupied by Mercury and Venus and the 7th by Jupiter and the moon; (v) the 11th, 10th, 4th and 2nd houses from the sun in Vṛścika are occupied by Venus, Jupiter, Moon and Mercury respectively; (vi) Jupiter, the moon and the sun are posited in Kumbha, Vṛṣa and Vṛścika and Mars and Saturn in Makara; (vii) the malefics (Mars and Saturn) occupy the 6th 7th houses respectively from the sun in Vṛścika. The summer crop would perish if the sun is in Vṛścika and (1) the malefics (Saturn and Mars) occupy the 10th and 12th houses or either of them is in possession of the 7th house from Vṛścika; (2) A malefic (Saturn or Mars) in the 2nd house from Vṛścika is unaspected by benefics; (3) Mars and Saturn are posited in the 7th and another *Kendra* house (4th or 10th) from the sun in Vṛścika. Similarly, forecasts were made about good or bad prospects of the autumnal crops from the sun's entry into Vṛṣa (XXXIX.1-44).
57. XXVI.1, 10.

58. *Arthaśāstra*, II.24, p.115.
59. *Udyāna*, XVI.28; XLIV.4; XLVII.15; LV.3; LVIII.2; *ārāma*, LIV.1, 3; LV.2; *BJ*, XVII.4 (*udyāna-sakta*).
60. *HDS*, II, pp.157, fn. 370, 844, fn.1992.
61. *ASWI*, IV. Nasik inscr. No.5, line, 2, of Uṣavadāta, p.99.
62. V.R. Pandit's ed.
63. Cf. *Kāmasūtra*, I.IV.4.
64. Cf. LIII.119, which recommends plantation of certain trees on the banks of a tank. For references to trees on the banks of water-reservoirs, see LV.1, 45; on those of rivers, LV.6-7; LVIII.2; also cf. *Rāmāyaṇa*, III.15; *EI*, IX, p.247; *Upavana-vinoda*, verse 1.
65. *Agni-purāṇa* Ch.194; G.P. Majumdar, *Vanaspati*, p.45; also Khana's maxim 'Gourds flourish under the influence of fish-washings'.
66. LIV.28 (*karakonmiśramṛdi*), 30 (*karakājalamṛdyoge*).
67. Cf. Utpala on LIV.19:— आज्ययुतहस्तयोजितम्, आज्ययुतेन घृतेनाभ्यक्तेन हस्तेन करेण योजितं क्षीरमध्ये क्षिप्तम्। पुनर्गृहीत्वा घृताभ्यक्तेन करेणैकीभूतं पृथक्कार्यम्। एवं प्रत्यहं कर्म कार्यम्। यावद् दश दिनानि।
68. G.P. Majumdar, *Vanaspati*, pp.39-40, 63; *Upavana-vinoda*, pp.13 ff.
69. R. Gangopadhyaya, *Agriculture and Agriculturists in Ancient India*, p.69.
70. P.K. Code, "History of the Art of grafting plants," *IC*, XIII, pp.25-34.
71. Cf. Utpala on LIV.4-5 : ततोऽनन्तरं परं प्रकृष्टं मूलोच्छेदे अथवा स्कन्धे रोपणीयाः। अन्यवृक्षस्य मूलोच्छेदं कृत्वा तस्य छिन्नमूलस्योपरि विजातीयो वृक्षो रोपणीयः। अथवा स्कन्धादर्धादन्यवृक्षं छित्वा तस्य स्कन्धमुत्कीर्य विजातीयो वृक्षो रोपणीयः। तत्र मृत्तिकाश्लेषं दापयेदिति।
72. R.E. II, *SI*, p.18.
73. Cf. *Matsya-purāṇa*, CCLV.22-4.
74. *Śākuntala*, Act I, p.25.
75. शीतवातातपै रोगो जायते पाण्डुपत्रता।
अवृद्धिश्च प्रवालानां शाखाशोषो रसमुतिः॥
LIV.14
76. शाखाविटपपत्रैश्च छाया विहिताश्च ये।
येऽपि पर्णफलैर्हीना रुक्षाः पत्रैश्च पाण्डुरैः॥
शीतोष्णवर्षवाताद्यैर्मूलैर्व्यामिश्रितैरपि।
शाखिनां तु भवेद्रोगो द्विपानां लेखनेन च॥
Cited on LIV.15.
77. Varāhamihira asks the cultivator to be duly purified and to worship the tree with a bath and anointment before planting it (LIV.8). For auspicious time of planting, cf. LIV.31; XCVII.6.
78. XV.3; XIX.1, 7; XXIV.15; XXXII.10; XLV.66, 93; XLVII.7, 5, etc.

79. XLV.75.
80. *Vṛkṣa-gulma-latās=ca*, XXIX.14; *taru-gulma*, XL.7; *pādapa-gulmavallyah*, LIII.100; *druma-gulma-vallyah*, LIII.101, 105; *gulma*, XI.2; *taru-gulma*, XCIII.13.
81. Also cf. *gulma ekamūlo vṛkṣah*, XXIX.14; *gulmair=ekamūlajaiḥ*, *śākhāsamūhaiḥ sūkṣmaiḥ*, XLVII.5; *gulmair=ekamūlaiḥ*, *śākhā-samūho gulmaḥ*, LIII.90; *gulma ekamūlah śākhā-samūhah*, LIII.100; *gulma eka-mūlajah śākhāsamūhah*, LXXXIV.1.
82. Cf. *Amrakoṣa*, II.4.6.
83. Elsewhere it is used for plant life in general, cf. XXIX.1
84. XLVII.5; LIV.18; LXXXIV.1.
85. *Manu*, I.48.
86. G.P. Majumdar, *Upavana-vinoda*, pp.11-12.
87. V.41; X.13; XVI.7; XIX.12; XXXII.10; XL.2; XLVII.37; XCIX.5.
88. *Tṛṇa-taru-gulma*, LIII.90; *śara-darbha-gulma-vallī*, XCIV.5.
89. XLVII.4; LII.84; LXXVIII.4. Cf. also LIII.53—*kaṇṭaky=akaṇṭakānām*.
90. LII.84-5; LXXVIII.18; LXXXV.17.
91. LXXXV.17.
92. VIII.3, 46, XV.1, 14; CIII.47.
93. For instance, red flowers were regarded as especially sacred to the Sun, Mars and Agni (CIII.47; YY, VI.4, 6, 7; BY, XVIII.3, 5, 9, 10); white to Vāyu and the Moon (CIII.47; YY, VI.14, 15; BY, XVIII.6-8); yellow to Jupiter (CIII.47; YY, VI.18; BY, XVIII.14-15); black to Saturn, Rāhu and Yama (CIII.47; YY, VI.11, 13, 8; BY, XVIII.18-20); blackish red, to Nirṛti (YY, VI.10); and variegated ones, to Venus, Kubera and Indra (YY, VI.7, 16, 2; BY, XVIII.16-17).
94. The details about the plant life noticed elsewhere in other contexts are not repeated here. In the case of plants bearing more than one name, all the necessary information is given under the name which comes first alphabetically.
95. Rhys Davids in the *Pali-English Dictionary*, s.v. *coca*, states that both the derivation and meaning are uncertain and the word is certainly not Aryan.
- 95a. Cf. *Kumāra-sambhava*, I.8.
96. Also rendered as *Wrightia antidysenterica* or *Nericum antidysentericum*.
97. LXXXV.10, 24.
98. LXXXV.10, 24. Cf. XLV.65, where urban and wild birds are contrasted.
99. XCV.5.
100. IV.5; XV.2; XXI.23.
101. LV.5.
102. V.33.

103. XVII.24.
104. IX.33.
105. Cf. XCIV.58 *sthalacara*.
106. LXXXV.24; XLV.65; LXXXVII.1.
107. LXXXV.24; XLV.65; LXXXVII.2.
108. For enumeration of creatures with feminine names, cf. Parāśara cited by Utpala.
109. III.38; XV.13; XLVII.13.
110. XXI.16; XXIV.12; XLV.91, 94.
111. XXIV.25.
112. XXX.5; LXXXV.43.
113. XXX.7; XLV.66; XCVI.7.
114. Cf. LXXXV.67, where creatures subsisting on grass, water, flesh and grains are mentioned.
115. Cf. LXXXV.28, where burrow-dwellers are distinguished from the tiger, bear, monkey, leopard and buffalo.
116. III.25, 38; VI.3; VIII.4; XV.3, 13; XXI.16; XXIV.12, 25; XXX.5, 7; XXXIII.9, etc.
117. XLVII.14; XC.1.
118. XL.4; XLVII.13, 76; LV.28; LXVII.18, 95.
119. XI.47.
120. L.19; LXXXVI.42, etc.
121. LXXXVIII.1.
122. XXVII.4.
123. XXIV.15.
124. LXXXVI.42.
125. V.33.
126. XLIX.24.
127. The following is based on *BS*, Hastilakṣaṇādhyāya, Ch. LXVI.
128. Bhadra is also named in LXXX.20.
129. *Arthaśāstra*, II.31, p.137.
130. *Mānasollāsa*, Vol.II, p.192, V.35.
131. *Arthaśāstra*, II.31, p. 136. For the definition of these four varieties, see the anonymous verses quoted by Utpala on LXVI.10.
132. Cf. *Arthaśāstra*, II.32, p.139.

133. XLIII.13; XLVII.76; L.19; LXVII.17, 37; LXXXV.28.
134. LXVII.115; CIII.4; XII.6.
135. LXXXV.21, 28, 42.
136. XII.6.
137. XXXIII.9; LXVII.18, 37; LXXXVIII.24; LXXXV.38; XCIII.5.
138. LXVII.104; LXXXV.48; LXXXVI.9; LXXXVII.28.
139. XII.6; XXIV.21; XXVII.4.
140. IX.40; LXXXVII.35.
141. XXVIII.5; LXVII.64; LXXXV.65.
142. XLVII.76.
143. XLVII.14; XC.1. When used in association with *kuraṅga* (LXXXV.23, 26) 'and *pr̥ṣata* (LXXXV.38; LXXXVII.33), *mṛga* seems to denote a kind of deer, not deer in general.
144. CIII.28; LXVII.65.
145. XLVII.13.
146. LXXXV.23, 26, 48; LXXXVII.33.
147. XLVII.76; LXXXV.38, 48.
148. LXXXV.26.
149. LXIV.2, 8.
150. LLVII.76; LXXXVII.3, 33.
151. LX.13.
152. LX.7.
153. In LXXXV.20, Utpala explains *chikkāra* as *mṛga-jāti* and in LXXXV. 44 as *śṛgāla*. *Dhikkāra*, which is mentioned as synonymous with *mṛgajāti* in LXXXVII.7, seems to be an error for *chikkāra*. It is evidently the same as the deer popularly called *chikārā*.
154. Implied in the use of *mṛga* for musk, LXXVI.12, 1, 26, 27.
155. IX.40; LXXVIII.34; LXXXV.27; XCIV.47.
156. LXVII.104.
157. LXXXV.42; LXXXVII.9.
158. XXIV.15.
159. LXIX.22; LXXXV.27.
160. LXXXV.28; LXXXVII.3.
161. LXVII.4.

162. LXX.12; XCVI.9.
163. LXXXV.21.
164. XLV.67.
165. LXXXV.22.
166. LXXXV.37; LXXXIX.3, 5, 11, etc.
167. LXXXIX.2.
168. LXXXV.23.
169. LXXXVII.3.
170. LXXXV.22, 26, 42.
171. LXXXVII. 2, 21.
172. LXXXV.43.
173. IV.II, 14; V.33, etc.
174. XII.16; XLV.55.
175. XL.3; XLV.55.
176. LXXXVI.22; LXXXVII.9.
177. In VIII.42, cow is associated with temples and Brāhmaṇas. A cow was made to stay at the house-site for a night before the construction began (LII.96). Also cf. XLVII.11.
178. XII.6; XV.16; XXIV. 35; XLVII.76.
179. XLV.62.
180. LXVII.115.
181. XCIV. 24.
182. XL.3.
183. XLV.55.
184. उज्जू अकिसणकन्ती तारन्ते ई समल्लिआकुसुमे।
भाविज्जइ अच्छीइं जाणं ते मल्लिआअच्छा।।
Sudhakara Dvivedi renders it into Sanskrit as follows:—
ऋजुनी अकृष्णकान्तिनी तारान्ते समल्लिकाकुसुमे।
भाव्येते अक्षिणी येषां ते मल्लिकाक्षाः।।
185. शुक्लराजिपरिक्षिप्ते यस्यान्तर्लोचने शुभे।
मल्लिकाक्षो महाधन्यः स महाकृष्णतारकः।।
186. For the defects and merits of cows and oxen, see Ch. LX.
187. XXIX.7; XXXVIII.2; XLIV.8; XLV.94, etc.
188. LXXV.5; XLIX.24.

189. LXIV.1, 7,8.
190. For good qualities and defects of goats, see Ch. LXIV.
191. XLV.94; XVI.22; XIX.3, etc.
192. VII.6; X.3; XI.4, etc.
193. XCII.6, 9.
194. V.72.
195. V.41; XVIII.5; XXIX.7, etc.
196. V.66; IX.43; XXVI.8, etc.
197. XLV.52; XLIX.24.
198. षड्भिर्दन्तैः सिताभैर्भवति हयशिशुस्तैः कषायैर्द्विवर्षः
सन्दर्शैर्मध्यमान्त्यैः पतितसमुदितैस्त्रयब्धिपंचाब्दिकाश्च ।
सन्दंशानुक्रमेण त्रिकपरिगणिताः कालिकाः पीतशुक्लाः
काचा माक्षीकशंखावटचलनमतो दन्तपातं च विद्धि ॥
LXV.5.
199. *Aśva-vaidyaka*, III.156-7.
200. For the date of Nakula's *Aśva-cikitsita*, see P.K. Gode, *Studies in Indian Literary History*, II, pp.161-68.
201. For other details about horses, see LXV.1-4.
202. XXXVIII.9, 10.
203. XLV. 70; LXI.; LXVII.4; LXXXVIII.1, XCVI.8.
204. LXXXVII.9.
205. LXI.2.
206. III.35; XL.3; LXVII.31, 104, etc.
207. IX.40; XCI.3; CIII.61.
208. LXVII.95, 108; XLIV.9; LXXXVII.5.
209. III.35; IX.40; XVI.33, 35; XXXIII.9, etc.
210. LXXXV.26; LXXXVII.5.
211. XVI.33; XXIV.21; XLIV.9; LIII.106, etc.
212. III.35; XXXIII.9; XLI.7; LIII.62, etc.
213. XVI.19.
214. XXIX.7; L.19.
215. XXXVIII.2; XLIV.8.
216. XLIX.24.
217. III.38; XV.13; XLVII.13.

218. XXI.16; XXIV.12; XLV.91, 94.
219. XXIV.25.
220. VIII.4; IX.30; X.20; XVI.28; XXX.5, etc.
221. III.35; V.55.
222. XV.3; XXX.7; XLV.66.
223. LXXXVI.34.
224. XXVIII.14; LXXII.1; CIII.26.
225. III.28; XXIV.19; XXXIV.4, 6; LXXXV.20, etc.
226. XXXIII.26.
227. XXVIII.11. XLII.61; XLV.67. For its colour, cf. V.56; LIII.82.
228. LXXXVII.5.
229. LXXXV.37; LXXXVII.5, 14.
230. VII.20; XXVIII.11, 14; XLVII.6; LXXXVII.11; SCII.4.
231. XXVIII.4; XLII.62; XLIX.3, etc.
232. XXIV.21; LXXVIII.24; XCIII.5.
233. XCIV.17. For omens from crows' movements, see Ch. XCIV.
234. XXVIII.14; XXXIV.4; XLII.62; XLVII.6; LXXXV.23, 43, 48; LXXXVII.23-25.
235. LXXXV.21, 49; LXIX.22; LXX.12; LXXVIII.24; LXXXVII.36; XCIII.5.
236. XLII.62; XLV.67; XLVII.4.
237. XLII.62; XLV. 67, 68; LXXVIII.24 etc.
238. XLVII.4; LXXVIII.24; LXXXVII.11; XCIII.5; XCVI.9, etc.
239. XLII.62; XLIX.3; LXIX.22; LXX.12; XCIV.46.
240. XLIV.3, 6, 10, 11, 15.
241. XLIV.1; LXXXVII.20.
242. For omens from wagtails' movements, see Ch. XLIV.
243. XLV. 68 (warbling in dewy season inauspicious); LXXXV.23, 26.
244. XLVII.14; XCIV.11.
245. LXIX.7; LXXXV.37.
246. XLVII.7.
247. XLV. 68 (crowing in the evening inauspicious); LXXXV.20, 48 LXXXVI.6.
248. XXVIII.6; XLVII.6; LXXII.1. Utpala takes *kṛkavāku* to mean *jala-kukkuṭa* (on XXVIII.6), but Varāhamihira regards it as synonymous with *kukkuṭa*, cf. LXXXVII.7. Cock-fighting is alluded to in LXII.2.

249. LXXXVII.34.
250. LXII.3. For signs of cocks and hens, see Ch. LXII.
251. LXXXV.4. According to Utpala, it was popularly known as *lāṭa*.
252. LXXXVII.15.
253. LXXV.6.
254. LXVI.6, *grāma-caṭaka* according to Utpala.
255. LXXXVII.9.
256. XLVII.6.
257. XLVII.6; LXXXV.21; LXXXVII.15.
258. XLVII.6; LXXXV.21.
259. XXVIII.17; LXXXVI.7; LXXXVII.21.
260. LXXXVII.9, 18.
261. XLVII.6.
262. LXXXV.21, 37, 49. For its movements, see LXXXVII. 38-47.
263. Cf. *Mahābhārata*, I.132.68. Nilakaṇṭha tells us that it is a bird with blue wings or a vulture : *bhāsam nīla-pakṣam pakṣiṇam śakuntam-ity-anye, gr̥dhram-ity-apare*.
264. *Koka* and all the following birds are described as living in the proximity of water. *Koka*, *kāraṇḍava*, *cakravāka* and *hamsa* are represented as moving on water in autumn, XII.4, 8, 11.
265. XLVII.9; LV.4.5.7; LXXII.1; LXXXV.22.
266. Cf. *Amara*, II.5.24—*rājahamsās-tu te cañcu-caraṇair-lohitaiḥ sitāḥ*.
267. VL.5, 6; LXXXV.22, 27; XCII.7.
268. XXXIII.9; LIII.11, 33 (*ahi-nīlaya*), 36 (*ahirāja*), 41 (*ahi-saṁśraya*), 42, 67 (*ahigr̥ha*), 68 (*ahivāsa*), 85, 88 (*ahi-nīlaya*).
269. XVI.33; XXIV.13; LIII.28, 46, 66.
270. XII.12; LIII.70 (*bhujaṅga-gr̥ha*); LXXVIII.24; XCIII.5.
271. VI.3; XVI.5.
272. LIII.38 (*sarpa-vāsa*); LII.121; LXVII.20; LXXXV.65.
273. XII.12 (water polluted by serpents' poison); LXXXVII.19.
274. LIII.32, 71; LXXXV.41, 43.
275. VIII.4; XLIX.25; LXXXV.23; XCVI.7.
276. XLVII.14; LII.121; LIII.20; LXX.2; LXXXV.65; XCIV.4.
277. LXXXV.37
- 277a. LXXXVII.5, 47.
278. XXXIII.9; LII.120; LXXXV.42; LIII.13 (white), 69 (tawny); LXXXVII.3.

279. LII.121; LXXXV.41. Utpala (LXXXV.41) says that *saraṭa* is a bird, but to some it is the same as *kṛkalāsa*.
280. XXVIII.8; XLIX.3; LXXVIII.24; XCIII.5.
281. LIII.16; LXXXV.37 (*pallī* according to Utpala); LXXXVII.47.
282. LXXXVII.8.
283. XXX.8; XL.8; LIII.10, 15, 22 (*matsyaka*), 94.
284. XXVIII.4; XXXIII.10; XLIX.24.
285. XXVIII.14; LXVII.44, 45; LXXXVI.7.
286. LXXXV.65.
287. XXVII.7; XXVIII.4; LIII.7, 18, 30, 39, 67; LXVII.17.
288. XXIV. 19; LIII.31, 32, 64.
289. LII.121.
290. For good qualities of a tortoise, see Ch. LXIII.
291. A blue fly clinging to the head is said to cause death, XCIV.58.
292. A honey-comb inside a house, it was believed, makes it empty.
293. Elsewhere it is said that there is an increase in the lasciviousness on the part of bulls and birds in the spring season (XLV.84). For a comprehensive account of the mating seasons of different animals, cf. Parāśara cited by Utpala. Chs. LXXXV-XCV are very important for the study of ancient Indian fauna.
294. Special reference must be made to the remains of Indian ivory work found among the ruins of Pompei in Compania (*Annual Bibliography of Indian Archaeology*, Vol.XIII. pp. 1-5; S.K. Saraswati, *A Survey of Indian Sculpture*, pp.90-92, Pl.XVII, Fig. 79) and a magnificent collection of fragments of Indian ivory toilet from Begram in the ruins of the palace of Kaniska (*Annual Bibliography of Indian Archaeology*, 1937, pp.30-33; B. Rowland, *The Art and Architecture of India*, p. 91, Pl. 51; Saraswati, *op.cit.*, pp. 92-3, figs. 67, 72, 78). Also *vide JNSI*, XVI. p.73, Pl.2.23; *Indian Archaeology* for 1959-60, pp.24, 51; *ASI, AR*, 1911-12, pp.48, 93.
- In recent years some exquisite ivory female figurines dating from the early centuries of the Christian era have been reported from Ter (Oosmanabad district) and Bhokardan (Jalna district) in Maharashtra in course of archaeological work.
295. Cf. *Raghuvamśa*, XVII.21; *Harṣacarita*, Ch.VII.
296. *Lüders' List* No. 345.
297. Cosmas XII; McCrindle, *Ancient India as described in Classical Literature*, p. 165.
298. दन्तस्य मूलपरिधिं द्विरायतं प्रोज्झ्य कल्पयेच्छेषम्,
अधिकमनूपचराणां न्यूनं गिरिचारिणां किञ्चित्॥

LXXVIII.20; XCIII.1.

Cf. Utpala on LXXVIII.20— गिरिचारिणां पर्वतचारिणां न्यूनमपि प्रोह्य शेषं कल्पयेद् यतः
पर्वतशिलास्तदन्तान् वर्धन्ति।

दन्तमूलपरिणाहदीर्घतां द्विः प्रमुच्य परतोऽस्य कल्पयेत्।

BY, XXI.7.

299. दन्तमूलपरीणाहद्विगुणं प्रोज्झ्य कल्पयेत्।

अब्दे द्वयर्धे नदीजानां पञ्चाब्दे पर्वतौकसाम्॥

Arthaśāstra, II.32.p. 139

300. Thus figures resembling *śrīvṛkṣa*, Vardhamāna symbol, parasol, banner and fly-whisk were believed to ensure good health, victory, increase of wealth, and happiness. If the venation resembled a weapon, it indicated victory in war; one like the Nandīāvarta symbol, recovery of lost territory; one like a clod (*lostha*), full occupation of a conquered territory; one like a woman, loss of wealth; one like *bhṛṅgāra*, the birth of a son; one like a pitcher, acquisition of treasure; one like a rod, hindrance to a journey; those resembling a lizard, monkey and serpent, famine, disease and oppression by an enemy respectively; those like a vulture, owl and crow, pestilence; one like a noose or torso (*kabandha*), king's death. If the venation bleeds or is dark, grey, rough or bad-smelling, bad results must be expected. *Vide* LXXVIII.21-26; XCIII.2-7. Cf. *Viśvakarma-prakāśa*, X.78. which is verbatim reproduced from LXXVIII.26.

301. Cf. also BY, XXI.7-8.

302. V.60; XV.9, etc. For other references, *vide supra* Ch. IV, Section 3.

303. BS, Vol.I, p. 73.

304. XVI.14; XIX.10; LXXIX.10; CIII.12, 61.

305. XV.1. Cf. BJ X.3, which refers to earning livelihood by mining.

306. I.1; III.23, 36; XVI.4; XXIX.8; XL.2; XLIII.12; LXXXV.8; LXXXVI. 2, 3, 30.

307. XLVIII.4; LXXVIII.14; XCII.8.

308. XXIV.8; XLII.33.

309. LXXIII.7.

310. XL.7; XLI.6; LIX.4; XCIV.20; CIV.7, 8.

311. V. 74; XXIX.10; LIX.17; XCVI.13.

312. VII.20; XXVI.9; XLIV.6; LIII.110; BY, X.3.

313. XII.20.

314. XI.14; XVI.26; XXI.23; XXVI.9; XXIX.6; XXXIII.10; XXXIV.4; XLI.6; XLIII.12; XLVII.46; L.19; LXIII.1; LXXX.26.

315. L.17; XCIV.15; LXXXV.80.

316. III.21, 23; VI.13; XLVII.46; L.17; LIX.5.

317. LXXXVI.26.

318. XL.7; CIII.63.

319. XL.8, 10; XLIV.12; LXXXVI.23.

320. LVI.8.
321. XL.6; LVI.8.
322. LVI.8.
323. XXVI.9; XLIII.12; XLVII.46; LIX.4; LXXVIII.14.
324. BS, Vol.I, p. 65.
325. III.36.
326. BS, Vol. I. p. 65; IX.44.
327. निकष-सन्तापाभिनिवेशैः कनकस्येवाधिकतरममलीकृतस्य। BS, Vol. I, p. 65.
Cf. Utpala—निकषं निर्घर्षणं पाषाणतले। सन्तापोऽग्नौ परितापनम्। अभिनिवेशो यन्त्र-च्छेदन-संघटनमैतेः सुवर्णमधिकतरममलं भवति।
328. *Jivanti ca ye hutāśa-vṛityā*, V.35; *agny=upajivin* V.28; X.4; *agnivārta*, VI.1; XVII.13; *analājivin*, LXXXV.29; *analopajivin*, V.69; *analājivika*, XCIV.21; *analopajivaka*, VIII.3, *hutāśa-vṛtti*, V.53; *hutāśanājivin*, XVI.12.
329. Cunningham, *Coins of Ancient India*, p.5.
330. Watters, Vol. I, p. 178. Also cf. McCrindle, *Ancient India as described by Megasthenes and Arrian*, ed. by S.N. Majumdar Sastri, Calcutta, p.31, for an earlier reference to silver-mining in India.
331. XXVI.9; XLIII.12; LXXX.26; LIX.4; XLVII.46.
332. Smith, *History of Fine Arts in India and Ceylon*, p. 82, Pl.47B. For a standing female figure in copper from Bhita, see ASI, AR, 1911-12, p. 89.
333. Watters, Vol. II, p.171.
334. For the use of *loha* in plural, see *Arthaśāstra*, II.17.14.
335. The *Mahāvagga* (p.209-10), *Cullavagga*, (p.201) and *Pārājika* (p.346) employ the word *tambaloha* (Skt. *tāmrāloha*) in the sense of copper. See G.S.P. Misra, *The Age of Vinaya*, P.270.
336. Percy Brown, *Indian Architecture* (Buddhist and Hindu), p.61, Pl.X.
337. In the *Mahābhārata* (*Śānti*, LXIX.49) also the potter is called by this name.
338. For references, vide *supra* Ch.IV, Section, 7.
339. Cf. *Ancient India*, I (1946), pp.41ff. (Ahicchatrā); ASI, AR, 1911-12, pp.84 ff. (Bhita); *ibid.*, 1903-4, p. 93 (Basarh).
340. Cf. *Harṣacarita*, IV; V.S. Agrawala, *Gupta Art*, p.11.
341. Cf. *Mudrā-rākṣasa*, Act, II, pp.129-31, where the carpenter Dāruvarman repairs the palace and palace-gates before Candragupta's entry.
342. For these coin-words, see *supra* p. 263, note 297.
343. LIII.42. Cf. Utpala—*Puṭair-bhidyaṭa iti puṭa-bhit puṭa-bhedakah*

344. LIII.7. Cf. Utpala-*putair-bhidyata iti putā-bhedah*.

345. भेदं यदा नैति शिला तदानीं पलाशकाष्ठैः सह तिन्दुकानाम्।
प्रञ्चालयित्वानलमग्निवर्णा सुधाम्बुसिक्ता प्रविदारमेति॥
तोयं श्रितं मोक्षकभस्मना वा यत् सप्तकृत्वः परिषेचनं तत्।
कार्यं शरक्षारयुतं शिलायाः प्रस्फोटनं वह्निवितापितायाः।
तक्रकाजिकसुराः सकुलत्था योजितानि बदराणि व तस्मिन्।
सप्तरात्रमुषितान्यभितप्तां दारयन्ति हि शिलां परिषेकैः॥
नैम्बं पत्रं त्वक् च नालं तिलानां सापामार्गं तिन्दुकं स्याद् गुडूची।
गोमूत्रेण स्रावितः क्षार एषां षट्कृत्वोऽतस्तापितो भिद्यतेऽश्मा॥

LIII.112-115.

346. Cf. Utpala-*cākrikāś=cakreṇa caranti cākrikāḥ kumbhakāra-tailika-prabhṛtayah*

347. *CII*, III No. 16, p. 70, 1.8.

348. *ASWI*, IV, No. 12, p.104.

349. Dyeing had developed into a specialised art called *rāgayukti* experts wherein are referred to as *rāgayuktivid*, cf. XVI.17; LXXXVI. 17, 41.

350. LII.97, 103, 108; LV.30; LIX.18.

351. XLII.26.

352. XV.3, 9; XVI.17; XIX.10 XXXII.11; LXXXVI.33.

353. XCIV.21.

354. Inferred from XIII.1-2.

355. X.10; XV.9; XVI.19; XLII.26.

356. IX.43.

357. V. 39, 74; X.10; XXXIV.14. In inscriptions *lekhaka* denotes a drafter and is to be distinguished from the composer and engraver, cf. *CII*, III, No.18, p. 84, 1. 24; No.21, p.96, 1. 20; No.35, 1. 25; No.40, 1.23; No.80. p.289, 1.14; *IA*, VII, p.242.

358. *EI*, XV, pp.131, 139, 143; XX, p. 62.

359. LXXXVI.12. Fleet renders '*kāyastha*' as 'a writer' (*IA*, V, pp.57-8). Utpala gives '*devara*' as a synonym of '*kāyastha*'. Divira is mentioned in *CII*, III, No. 27, p. 122, 1.7. Also Cf. *IA*, VI, p.10, where Bühler renders *kāyastha* or *divira* as 'a clerk, writer, or accountant'.

360. *EI*, XV, pp.130, 133, 138-39, 143.

361. *Ibid*, p. 131, fn. 7.

362. V.29; XXIX. 7; LXXXVI.32.

363. XV. 5, 9, 11; XVI.17; XXXI.3; XXXII. 11; XXXV.30; LXXXVI. 43.

364. XXXIII.19.

365. IX.34; X.17; LXXXV.31.

366. IV.9
367. V.29, 34; XV.2; XVI.8, 12.
368. XVI.5.
369. XXXIV.12.
370. XXXIII.21.
371. XXXI.4.
372. VIII.52; LXXXVI.23; LXXXVIII.4; CIII.63.
373. V.35. 41; XVI. 12; XVII.17, 20, 24; XXXII.11; L.21; LXXXVI. 11, 37.
374. V.41; X.3; XV.26; XXXIII.11; CIII.61.
375. XVI.27.
376. V.80; VII.6; IX.32, 43; X.9, 16, 17; XV.7, 17; CIII.61, 62.
377. IV.8, IX.31.
378. VII.6.
379. XV.25.
380. X.10.
381. X.39. But cf. Utpala—*athavā ghoṣe gahvare ye nivasanti te ghausikāḥ*.
382. Cf. XCIV.44, for reference to female water-bearers.
383. LXXVII.11; LXXXV.32.
384. IX.21; LXXVII.9; LXXXVI.15, 39.
385. *Arthaśāstra*, III, 13; *Manu*, VIII.415; *Nārada*, V. 26.
386. Cf. *Arthaśāstra*, *Dāsakalpa* section. For a historical account of slavery, see Devaraja Chanana, *Slavery in Ancient India*.
387. Cf. *Arthāptir...bhṛtakajanāt*, *BJ*, X.1
388. LXVII.26, 36; *BJ*, XVIII.1.
389. *BJ*, X.1.
390. V. 69; LXVIII.36; C.6; *BJ*, XVI. 6; XVIII.12.
391. XLV. 13; L.25; LXVII.26; *BJ*, XIX.1.
392. V.36 XVI.5; LXXXV.30; LXXXVI.45.
393. CIII.61.
394. XVI.13.
395. XV.23.
396. IX.28. XV. 11, 19; XVI.26.

397. LXVIII.36; C.6; *BJ*, XVI.6.
398. *EI*, VIII p.36.
399. XLII.26.
400. L.21.
401. V.29; VII.6; IX.31; X.6.7; XV.8, 11, 13, 25; XVI.28; XVII.26; XXXII.10; XXXVIII 2; L.21; CIII.63.
402. XXXI.4.
403. X.17.
404. XVI.16.
405. V.21.
406. IX.43; LXVII.116.
407. VIII.3; XXXIV.5.
408. XLII.21.
409. LXXXV.74.
410. XLV.9.
411. XLII.22.
412. *Ibid.*
413. *Ibid.*, XLV.9.
414. XLII.22.
415. XLV.9.
416. XVI.26; LXVIII.17; LXIX.10
417. XLII.34; LXVII.95.
418. LXVII.45; LXXXV.73.
419. LXXXV.73.
420. XV.26.
421. CIII.23. Cf. *Amara* II.8.42. It is a variant reading given by Utpala, the other being—'*kathām staraṇam ca, Keciṭ kuthāstaraṇam=it-icchenti.*
422. *kutho vāraṇa-pambalas=tad=eva staraṇam.*
423. LX.9, 14, 15, 16.
424. IV.8.
425. X.10; XLVII.12.
426. IV.8; VII.6; IX.31; XVII.17.
427. X.10.

428. XVI.16.
429. XV.18; XVI.16; XIX.12; XXVIII.5.
430. LXXXVI.39.
431. IV.13; LXXXVI.14.
432. LXXXV.11.
433. *Sārthe pradhānam sāmye syāj=jāti-vidyāvayo=dhikam, ibid.*
434. LXXXVI.39.
435. ASI, AR, 1903-1, 04, p. 110, Pl.XLI. 19, 23, 29, 32, XLII.39, 40, 47, 274.
436. EI, XV, pp.130,133, 138-39.
437. Śreṇī was originally employed for an organisation of the people of different castes subsisting by the occupation of one caste like the *heḍābukas* (horse-dealers), *tāmbūlikas* (beetal-sellers), *kuvindas* (weavers) and *carmakāras* (tanners) as stated by Vijñāneśvara in his Mitāksarā commentary on *Yājñavalkya-smṛti*, II.30. Later texts like the *Smṛti-candrikā* (Vyavahārakāṇḍa, pt. 1, p.40) and the *Vīramitrodaya* (Vyavahāra, p.12) clearly admit the change and explain *śreṇī* as meaning 18 low castes like *rajaka*. The transformation of guilds into sub-castes appears to have gone much ahead even by the 9th century AD as indicated by Utpala's gloss which ignores the professional origin of the guilds and regards them simply as corporations of many people of the same caste. Also see Medhātithi on Manu, VIII.2 for the original meaning and cf. *Vaijayanī*, I.179 (*sajāti-śilpa-samhatyām-āsandhaḥ*) for the transformed sense.
438. X.13; XXXIV.19.
439. VIII.10. Cf. Utpala-*Bahūnām samāna-jātiyānām saṅghaḥ śreṇī tataḥ śreṣṭhāḥ pradhānāḥ*.
440. XXIX.10; XXXIII.25.
441. ASI,AR, 1903-04, pp.104, pp.104, 110. For a different view, vide Maity, *op.cit.*, pp.156-57.
442. Junnar Inscriptions, No. 24, ASWI, IV, p.96.
443. *Ibid.*, No. 27.
444. Nasik Inscr. of Ābhīra Išvarasena, *ibid.*, p. 104, II 10-12.
445. Nasik Inscr.No.9, *ibid.*, p. 102.
446. EI, XXI, p. 59.
447. CII, III, pp.81 ff.
448. *Ibid.*, p. 70.
449. Some instances are given below:—
 (a) Junnar inscr. No. 27, ASWI, IV: unspecified amounts deposited with bamboo-workers' and braziers' guilds; (b) Nasik Inscr. No. 9, *ibid.*, p. 102; Uṣavadāta

deposited in all 3,000 *kārṣāpaṇas*, 2,000 with a weavers' guild and 1,000 with another as permanent endowments at a fixed rate of interest to defray certain expenses of Buddhist monks; (c) Nasik Inscr. No. 12, *ibid.*, p. 104, II. 10-12; records various deposits with the guilds of *kulirakas*, *dedayatrikas*, oilmen and others; (d) A Mathura inscr. (2nd century AD), *EI*, XXI, p.89: 550 *purāṇas* deposited with a flour-makers' guild for an alms-house. The name of another guild cannot be made out; (e) Indore CP. inscr., *CII*, III, p. 70: Brāhmaṇa Devaviṣṇu deposited a perpetual endowment with an oil-men's guild at Indrapura for providing 2 *palas* of oil daily for maintaining a lamp in a Sun-temple; (f) Gadghwa inscr., *CII*, III, p. 38; Candragupta II permanently endowed 20 *dīnāras*, evidently with a guild, whose name cannot be made out, for maintaining two alms-houses; (g) Kumāra Gupta deposited two sums of 13 and 12 *dīnāras*, apparently with a guild or two, for providing two alms-houses, *CII*, III, p.40, II. 6-7, p.41, I.7.

450. *CII*, III, p. 80
451. *Ibid.*
452. R.G. Basak (*EI*, XV), D.C. Sircar (*SI*, p.284, fn.6) and Saletore (*Life in the Gupta Age*, p.366) take it to mean guild president or chief guild president, while according to K.N. Dikshit, it denotes Mayor, cf. *EI*, XX, p.61.
453. Damodarpur CP. inscr., *EI*, XV. pp.130, 133, 138-39.
454. Paharpur inscr., *EI*, XX, p.61.
455. XXVII.9. But this chapter is spurious.
456. XXVII.9. This stanza is not found in S. Dvivedi's ed.
457. L.15; LXXVI.32.
458. Cosmas, XII.
459. LXXVI.7, 8, 14, 24.
460. II. 228.
461. LXXVI.7, 8, 9, 23, 26, 30.
462. LXXVI.14.
463. S.Dvivedi's ed., Vol.II, p.941.
464. *Raghuvamśa*, IV.67, Yuan Chwang adds Udyāna and Darel (I, 225, 239, 261.)
465. LXXI.1.
466. LXXVIII.20; XCIII.1.
467. *Raghu*, IV.40, 83; VI.27.
468. *Arthaśāstra*, BK, II, Chs. 16, 21.
469. अतिवृष्ट्युल्कादण्डान् परिवेषग्रहणपरिधिपूर्वांश्च ।
दृष्ट्वामावास्यायामुत्पातान् पौर्णमास्यां च ॥
ब्रूयादर्धविशेषान् प्रतिमासं राशिषु क्रमात् सूर्ये

XLI.1-2.

470. *Dvi-triguṇo dhānyārgḥaḥ*, VIII.5. It should signify two or three times rise in prices and not fall as Utpala would have us understand:— *Dhānyasy-ārgho dviguṇas=triguṇo vā bhavati, dhānyasya yan=mūlyam=āsīt ten-aiva dviguṇam triguṇam vā labhyate*.
471. *Vide* also XXXIX.11-13; XL. 9-13.
472. *JRAS*, 1904, pp.307ff.
473. K.A.N. Sastri, *Foreign Notices of South India*, p.89.
474. The view of Louis Finot (*Les Lapidaires Indiens*, p.ii) that the *Kāmasūtra* is the earliest work to refer to *ratnaparīkṣā* is to be modified in view of the discovery of Kauṭilya's *Arthaśāstra* subsequent to the publication of Finot's work.
475. References pertain to Finot's work. Many useful texts are incorporated in it.
476. Finot, *op.cit.*, p.xx.
477. Buddhabhaṭṭa's work also belongs to the close of the 5th or the middle of the 6th century AD. From a painstaking analysis of close similarities and dissimilarities between the two works in certain respects, e.g., catalogue of gemstones, prices of diamonds, pearls, etc., Finot has shown the improbability of these works borrowing from one another. Certain similarities between them may be explained, according to him, on the hypothesis that both these works drew upon some common tradition or work, probably the *Ratnaśāstra* named by Buddhabhaṭṭa. *Vide* Finot, *op.cit.*, pp.vi.ix.
478. V.W. Karambelkar, who critically edited this work, believes that though Caṇḍeśvara abundantly draws upon the *BS* etc., he does not mention them expressly. *Vide* his preface to the *Ratnadīpikā*, p.ii. But Varāha of the said verse is certainly Varāhamihira.
479. Gems are referred to as *upala* in XII.5; LXXIX.3.
480. Cf. Buddhabhaṭṭa, I.2 ff.
481. e.g., Caṇḍeśvara's *Ratnadīpikā*, I.5-7.
481. Also mentioned in XVI.27; XXIX.8; XL.8.
483. Cf. LIII.110.
484. It is called *Rudhirākṣa* in *YY*, VI.9.
485. Finot, *op.cit.*, p.vii.
486. Cf. *BS*, LXXIX.2:- *Iha t-ūpala-ratnānām=adhikāro vajra-pūrtvaṇām; Śukranīti*, IV.2.47:- *Ratna-śreṣṭhataram vajram*.
487. *BS*, LXXIX.6-7. Cf. Buddhabhaṭṭa, I.18, who gives the same findspots.
488. Finot, *op.cit.*, p.xxv.
489. *Ib.* p.xxvi; J.C. Brown & A.K. Dey, *India's Mineral Wealth*, p.580; V.G. Desai, *The Ancient Chemistry of India* (Marathi), p.462.
490. It is referred to as Vayirāgara in Tiruvorūriur Adhipuriśvara temple inscr. of

Kulottuṅga Coḷa I and as Vajirāgara in the Pāṇḍava-Perumal Temple inscr. of his 5th regnal year. From this Kielhorn inferred that the original name of Wairagadh was Vajrākara (*EI*, VII. App.124-5, Nos.756-61). The fact that it is called Vajiraghara in the Hathigumpha inscr. of Khāravela (*EI*, XX.p.79.1.7) has led K.P. Jayaswal and R.D. Banerji to opine that Vajragrha was the original name (*ibid.*, p.78).

491. *Arthaśāstra* (Engl.Tr. by R. Shamasastri), p.78, fn. 8.
492. Brown & Dey, *op.cit.*, pp.580-81. (It gives a list of diamond-bearing localities in Vindhya Pradesh): Desai, *op.cit.*, pp.461-62. Finot (*op.cit.*, p.xxvi), however, thinks that Kosala refers to region round Ayodhyā where Panna diamonds were brought and sold. According to a commentary, Kauṭilya's Madhyamarāṣṭra, a source of diamonds, refers to the Kosala country. *Vide* Shamasastri, *op.cit.*, p.78, fn.9.
493. B.C. Mazumdar, *Orissa in the Making*, Calcutta, 1925, pp.77-78.
494. The *Arthaśāstra* mentions the mountain Maṇimantaka as a source of diamonds and the commentator adds the mountains Sahya, Vindhya and Vedorkaṭa (*ib.*, p.78, fn.12).
495. Kauṭilya refers to the diamond-mines of Indravāṇaka which, according to a commentary, is identical with Kalinga (*ib.*, fn.11).
496. Brown & Dey, *op.cit.*, p.580.
- 497a B.C.Mazumdar, *op.cit.*, p.78
- 497b. According to a commentary on the *Arthaśāstra* quoted by Shamasastri (p.78, fn. 12), "Magadha, Kalinga, Śūrpaka, Jaladayasa, Pauṇḍraka, Barbara, Tripura, the mountains such as Sahya and Vindhya, Benaras, the mountain of Vedotkaṭa, the country of Kosala and Vidarbha are the places where diamond-mines are situated."
498. Cf. Utpala-*prakīrṇakam yasyām bhūmau maṇaya bhavanti samudre yathā*. For ocean or water as a source of jewels, cf. V.42; VII.6; X.7; XII.16 XIII.10; XL.8; LXXXVI.10.
499. Finot has also discussed this problem, but failed to arrive at any satisfactory conclusion.
500. For a comparative table, *vide* Finot, *op.cit.*, p.xxx; for Buddhahatṭa's text, *ibid.*, p.11, No.39.
501. सर्वद्रव्याभेद्यं लघ्वम्भसि तरति रश्मिवत् स्निग्धम् ।
तडिदनलशक्रचापोपमं च वज्रं हितायोक्तम् ॥
काकपदमक्षिकाकेशघातुयुक्तानि शर्करैर्विदग्धम् ।
द्विगुणाश्रि दग्धकलुषत्रस्तविशीर्णानि न शुभानि ॥
यानि च बुद्बुददलिताग्रचिपिटवासीफलप्रदीर्घाणि ।
सर्वेषां चैतेषां मूल्याद् भागोऽष्टमो हानिः ॥

LXXIX.14-6

502. Kālidāsa (*Raghuvamśa*, I.4) refers to "a gem pierced by vajra" : *Maṇau vajra-*

samutkirṇe. Mallinātha explains it as a special kind of needle meant for piercing precious stones (*vajreṇa maṇi-vedhaka-sūci-viśeṣeṇa*) and cites Keśava in his support. At present the diamond is noted as a material of superlative hardness and the superfine finish obtained from the use of diamond lathe-tools is unsurpassed, cf. Brown & Dey, *op.cit.*, p.585.

503. Utpala is mistaken in taking “*tarati*” to mean “sinks”:- *ambhasi jale tarati nimajjati*.
 504. Cf. *Rāja-taraṅgiṇī* IV.331.
 505. Cf. *Śukranītisāra*, IV.2.53; Buddhabhaṭṭa, I.45; Caṇḍeśvara, I.42.
 506. Utpala wrongly takes *śronī* to mean a woman’s lower lip—*śroninibhaṁ sṛy=adhara-rāga-saḍṛśam*.
 507. द्विपभुजगशुक्तिशंखाभ्रवेणुतिमिसूकरप्रसूतानि ।
 मुक्ताफलानि तेषां बहुसाधु च शुक्तिजं भवति ॥

LXXX.1

508. Finot, *op.cit.*, text, No.75
 509. *Arthaśāstra*, II.XI.p.75; Engl. Tr. by Shamasastri, pp.75-6 & notes.
 510. J.W. McCrindle, *Ancient India as described by Megasthenes and Arrian*, pp.62-63.
 511. Giles, *Travels of Fa-hien*, pp.66, 69. Alberuni (I.201) informs us that the pearl-banks of Sarandib (Ceylon) had been abandoned in his time.
 512. Marco Polo (K.A. N. Sastri, *Foreign Notices of South India*, pp.162-63) also describes the pearl-fisheries of Malabar.
 513. Watters, II. p.228.
 514. Finot, p. xxxv of table.
 515. Buddhabhaṭṭa gives another tariff, *vide* Finot, p. xxxv for table.
 516. For another allusion to fish-pearls, cf. XL.8.
 517. Serpentine stones are also referred to in XII.5; LXXXI.5-6.
 518. LXXXI.1-2, Cf. Buddhabhaṭṭa, III.7.
 519. *Arthaśāstra*, II.11, p.76.
 520. For a different system of pricing, *vide* Buddhabhaṭṭa, III.144.
 521. S.M. Tagore (*Maṇi-mālā* cited by Finot, p.xviii) regards *gandhasasyaka* as ‘a reddish stone more or less bright’. The *sasyaka* described by Utpala must be different from it.
 522. *Ibid.*
 523. *Arthaśāstra*, II, 11.p.77.
 524. II.12, p.82.
 525. Comm. on XXX.20; XXXVII.1.
 526. XII.5.

527. XII.4.
528. XII.2. The coral is also referred to in XLI.10; XVI.13; XXIX.8.
529. LXXXVI.10.
530. XII.1, 3, 5.
531. XIV.14.
532. Cf. *Arthaśāstra*, II.19; *Caraka*, *Kalpasthāna*, XII; *Manu*, VIII. 135; *Amara* II.9.86.
533. Cf. *Arthaśāstra*, II.19, p.104. According to *Manu* (VIII.135), however, 10 *palas* = 1 *dharaṇa*.
534. *Arthaśāstra*, p. 103.
535. Cf. *ibid.*, p.104; *Amara*, II.9.87.
536. Cf. *Caraka*, *Kalpasthāna*, XII; *Amara*, II.9.89.
537. *Ibid.*
538. पलान्यपामाढकं चतुःषष्टिः
LII.91.
Cf. *Utpala* : अथवा यत्र मृत्तिकानामाढकमपामम्बूनां चतुःषष्टिः पलानि भवेत् तद् धन्यमेव । एतदुक्तं भवति ।
भूमौ मृत्तिकां सङ्गृह्य अवटनिर्गतां तथा आढकमापूर्य तोलयेत् । तद्यदि चतुःषष्टिः पलानि भवन्ति तद् धन्यं
नान्यथेति ।
539. Cf. the SS verse cited by *Utpala* on XXIII.2.
540. जालान्तरगते भानौ यदणुतरं दर्शनं रजो याति ।
तद्विन्धात् परमाणुं प्रथमं तद्धि प्रमाणानाम् ॥
परमाणुरजो वालाग्रलिक्षयूकं यवोऽङ्गुलं चेति ।
अष्टगुणानि यथोत्तरमङ्गुलमेकं भवति सङ्ख्या ॥
LVII.1-2.
541. यवा मध्यान्विता अष्टावङ्गुलं ज्येष्ठमुच्यते ।
सप्त मध्यमसङ्ख्यानामङ्गुलं षट् कनीयसाम् ॥
BS, Vol. II, p. 663.
542. कर्माङ्गुलं यवाष्टकमुदरासक्तं तुषैः परित्यक्तम् ।
LXXVIII.8.
543. *Arthaśāstra*, II.20, p.106.
544. इत्यत्र संदिह्यते किमष्टयवेनाङ्गुलेन चतुर्विंशत्यङ्गुलैर्यो हस्तः स शम इति । विश्वकर्मणा त्रिविधो हस्त उच्यते...
तत्राष्टयवाङ्गुलः प्रशयाख्यः । सप्तयवाङ्गुलः साधारणः । षड्यवाङ्गुलः शमाख्य इति । अत्रोच्यते । आचार्येण
शब्दाभिधानसामान्येनैव हस्तः शमोऽभिहितः । अन्यश्च विश्वकर्मणा त्रिविधस्यापि हस्तस्य प्रत्येकं कर्म प्रदर्शितम् ।
तत्राप्यष्टयवेनैवाङ्गुलेन यो हस्तस्तेन गृहकर्मोक्तम् ।
BS, Vol. II, p. 663
- 544a. Cf. तथा च पुराणे चतुर्हस्तो धनुः स्मृतः ।
धनुर्दण्डो युगं नाली तुल्यान्येतान्यथाङ्गुलैरिति ।
—*Utpala* on XXIV.9.

545. *Arthaśāstra*, II.20, pp.106-107.
546. योजनमष्टौ क्रोशः क्रोशश्चत्वारि करसहस्राणि ।
हस्तः शङ्कुद्वितयं द्वादशभिः सोऽङ्गुलैः शङ्कुः ॥
BS, Vol. I, p. 48.
547. *Supra*, pp.316 ff.
548. *Supra*, p.319.
549. अशीत्या श्वेतिकानां पणः पणविंशत्या कार्षापणः ॥ तथा च ।
विंशतिः श्वेतिकाः प्रोक्ता काकिण्येका विचक्षणैः ।
तच्चतुष्कं पण इति चतुर्थं तच्चतुष्टयम् ॥
चतुर्थकचतुष्कं तु पुराण इति कथ्यते ।
कार्षापणः स एवोक्तः क्वचित्तु पणविंशतिः ॥
550. *Manusmṛti*, VIII.136.
551. Rapson, *BMC, Andhras*, etc., p. clxxxiii f.
552. D.C. Sircar, *Select Inscriptions*, p. 357, text-line 6, note I.
553. V.V. Mirashi, *Inscriptions of the Kalacuri-Chedi Era*, CII, IV, p.clxxxii.
554. The silver coins of Kṛṣṇarāja were known as *Kṛṣṇarāja-rūpakas* see *ibid.*, p.151, lines 38-39.
555. *Ibid.*, p.clxxxii.
556. *BJ*, XXVIII.9.
557. *Supra*, p.8.
558. *CII*, p.151, lines 38-9.
559. *JNSI*, XV, p.32.
560. As we have seen above, the *Ratna-parīkṣā* of Buddhabhaṭṭa, which appears to have been composed about the same time as the *Bṛhat-saṃhitā*, also contains reference to *rūpakas*.

The word *kṛṣṇala* occurring in LXXX.II is sometimes supposed to refer to the coin of that name (*JNSI*, XIX, p.116). But in the verse under consideration it is used as a synonym of *guñjā* and denotes a weight. The relevant portion of the verse (चत्वारः कृष्णला नवतिमूल्याः) actually means that a pearl, 4 *kṛṣṇalas* in weight, is priced at 90 *kārṣāpaṇas*.

6

Astrology in Everyday Life

Sāmvatsara; Beliefs pertaining to the Sun; Moon; Eclipse; Mars, Mercury, Jupiter, Venus, Saturn; *Ketus*; Canopus; *Sandhyā*; Earthquake; *Utpātas*; *Aṅgavidyā*; Signs of Men and Women; Five Great Men : *Mālavya*; *Bhadra*; *Śaśa*; *Haṁsa*; *Rucaka*; Attendants of Five Great Men: *Vāmanaka*; *Jaghanya*; *Kubja*; *Maṇḍalaka*; *Sācin*; Wearing New Clothes; *Śākunas*; *Agni-lakṣaṇa*.

356-74

Notes and References

374-78



As most of Varāhamihira's writings are on natural astrology, a work like ours analysing their contents will remain incomplete without a notice of astrological beliefs current in those days. At the same time, it is neither necessary nor possible to record them in full, for that will mean the reproduction of the whole of the *Br̥hat-saṁhitā* and other works which is not the object of the present writings. Hence we shall indicate them only briefly.

The history of astrological beliefs in India goes back to a hoary antiquity. The Vedic civilization exhibits belief in the *śākunas*, prognostications and omens.¹ In the *Chāndogya Upaniṣad* (VII.1.2, 4), *daiva* and *nakṣatra-vidyā*, meaning the knowledge of the *utpātas* or natural disturbances and *jyautiṣa* respectively, are included in the list of the sciences studied by Nārada. Pāṇini refers to the belief in divination from bodily signs and to fortune-telling by soothsayers, while the inclusion in the *Ṛgayaṇādigaṇa* of *utpāta*, *sāmvatsara*, *muhūrta* and *nimitta* as subjects of study indicates the study of astronomy and omens in his days.²

Sāmvatsara

The office of the astrologer variously called *sāmvatsara*,³ *sāmvatsarika*,⁴ *sāmvatsarapāṭhin*,⁵ *daivajña*,⁶ *daivaivid*,⁷ and *daivacintaka*⁸ was a *sine qua non* of the state in ancient India. As may be naturally expected, Varāhamihira is the

strongest advocate of the astrologer's cause and devotes one full chapter (*Sāmvatsara-sūtrādhyāya*, Ch. II) to the description of the qualifications and importance of the *sāmvatsara* for the state and society. He advises the king to respect and secure the services of a learned *sāmvatsara*,⁹ who was to appoint four other astrologers to assist him.¹⁰ He observes that a king who does not honour a learned astrologer is destined to destruction and that neither a thousand elephants nor four times that number of horses are able to accomplish so much as a single astrologer who knows well time and clime and likens a king without a *sāmvatsara* to the night without a lamp, to the firmament without the sun and to a blind man mistaking his path.¹¹ He further states that neither parents nor relations and friends are so solicitous of the welfare of the monarch and his retinue as a reliable astrologer seeking fame and exhorts one desirous of prosperity not to live in a country where there is no *sāmvatsarika*.¹² The *Gautama-Dharmasūtra* (XI.15-16), the *Viṣṇudharmasūtra* (III.75), the *Yājñavalkya-smṛti* (I. 307, 333; III. 171-2), the *Viṣṇudharmottara* (II.4.5-16) and the *Kāmandakiya Nītisāra* (IV.33) also plead for a king's dependence on the astrologer.^{12a} Even Kauṭilya, who is against too much reliance on astrology, mentions *kārtāntika*, *naimittika* and *mauhūrtika* in the list of royal officers of the sixth category drawing an annual allowance of 1000 *paṇas*.¹³ It must be remembered, however, that as an unorthodox science, the practice of astrology is unequivocally condemned by early Buddhist, Jaina and Brāhmaṇical writers. Thus the *Brahmajālasutta*¹⁴ includes *nimitta*, *uppāda* (*utpāta*) and *angavijjā* in the list of condemned sciences. The Jātakas frequently refer to the Brāhmaṇas taking to the profession of foretelling the future by observing the movements of the limbs (*aṅga—vijjā-pāṭhakas*) and auspicious marks on the body (*lakṣhaṇa-pāṭhakas*) and reading dreams (*supiṇa-pāṭhakas*), the diviners (*nemittikas*) and the *nakkhatta-jānanakas* and accuse them of resorting to fraudulent practices.¹⁵ The Jaina works like the *Thāṇāṅga-Samavāyāṅga* and the *Uttarādhyayana-sūtra*, too, include them in the category of sinful sciences and prohibit the Jaina monks to practise them.¹⁶ Manu (VI.50) also enjoins that a Brāhmaṇa should in no case try to procure alms by practising the art of *utpāta*, *nimitta*, *nakṣatra*¹⁷ and *aṅgavidyā*. But this series of strong condemnations only tends to show that these enjoyed great popularity with the common folk. And with the increasing belief in the impact of astrological factors on worldly life the attitude of Brāhmaṇical writers underwent a change which is reflected in their advocacy of the king's reliance on the astrologer, as shown above.

Varāhamihira places a very high ideal before the *sāmvatsara*. The latter was not only required to be well-versed in the three branches of *jyotiṣa* viz., mathematics, horoscopy and natural astrology, and to possess necessary intellectual attainments, but was also expected to be physically good-looking, for it was believed that the physical form is an index to one's merits and defects.¹⁸ The various subjects he was required to study will be mentioned in Chapter VIII. One desirous to be a real *sāmvatsara* was expected to have a sagacious bent of mind. Thus, 'it is possible for a man trying to cross the ocean to reach the other shore by the force of the wind, but an unsaintly man cannot reach even mentally the end of the great ocean called Kāla-puruṣa, that is, astrology.'¹⁹ But, as usual, there were astrologers who made forecasts by taking recourse to such objectionable practices as sorcery, possession by deities, and hearsay,²⁰ who professed to be diviners without studying the science properly (II.16), and who made predictions only for the sake of material gain (II.18). Varāhamihira brands such people as *nakṣatra-dūṣakas* (II.16) and condemns them in unequivocal terms (cf. II.1, 2, 17).

Our author mentions a very wide range of astrological beliefs current in his time. He does not merely record superstitions relating to the sun, the moon, planets, constellations and zodiacal signs but also dilates upon the interpretation of the movements of the limbs and bodily marks, the signs of the great men, the *śākunas* and the like. Let us now proceed to notice them in brief.

Sun

While the natural course of the sun was taken to foreshadow good results, its unnatural course was supposed to be calamitous. It was believed that the sun retracing its motion without reaching of *rāśis* Makara (in the northern course) and Karkāṭaka (in the southern course) forebodes destruction to the south and west and to the north and east respectively (III.4). On the other hand, the sun returning after crossing these two *rāśis* was believed to promote welfare and prosperity of crops (III.5). It was believed that even on non-eclipse days²¹ a planet called Tvaṣṭṛ may darken the solar disc which results in the destruction of seven kings and their subjects by weapons, fire and famine (III.6).²² Thirty-two comets (*ketus*) known as Tāmasakīlakas and regarded as the sons of Rāhu when seen in the sun's disc were believed to be followed by evil results like famine, thefts, foreign invasion, king's death, deposition and replacement and the outbreak of various diseases which were predicted by observing the colour, position and shape

of the comets (III.7-20). Various auspicious and inauspicious results were also supposed to accrue from the colour and form of the sun, from the rainbow, halo and the clouds surrounding it, and from the position of the mock sun and the meteors, thunderbolt and lightning striking the sun (III.21-39).

Moon

The moon passing by the south of the constellation Jyēṣṭhā, Mūla, the two Āṣādhās, Viśakhā and Anurādhā was considered to be inauspicious and believed to cause fear from fire and the destruction of seeds, aquatic beings and forests, while that passing through the middle of Viśakhā and Maghā was regarded as auspicious (IV.5-6). The ten unusual appearances of the moon called *Nausamsthāna*, *Laṅgala*, *Duṣṭalāṅgala*, *Sama*, *Daṇḍa*, *Kārmuka*, *Yuga*, *Pārśvaśāyin*, *Āvarjita* and *Kuṇḍa* and the good and evil results accruing from them are described in IV.8-15. The various shapes, sizes and colours of the moon were also taken to have their own effects (IV.16-20, 29-32). The moon's orb being broken by various planets including a comet was believed to forebode evil (IV.21-27). It was believed that if the moon, when eclipsed, is cut by a meteor, it foreshadows death of the king born in the star where the moon is posited for the time being (IV.28).

Eclipse

Though the fact that the lunar and solar eclipses are caused by the moon entering the shadow of the earth and the disc of the sun respectively was known (V.8. Also cf. V.4-7, 9-13), it was popularly believed that they are caused by the demon Rāhu, the son of Sirmhikā, a wife of the sage Kaśyapa. His head, even though chopped off by Viṣṇu, was, according to popular belief, not deprived of life as a result of the potency of the *amṛta* he had tasted, and became a planet (V.1). It was believed that his disc, though similar to that of the moon and the sun, is not visible in the firmament on non-eclipse days owing to a boon of Brahmā (V.2).²³ Some held that only the head and tail of Rāhu can be seen; others thought that he has a serpentine form; still others opined that he is formless and of the nature of pure darkness (V.3). That Rāhu is really the ascending node of the moon is clearly stated in V.15. It was a current belief that an eclipse can be ascertained beforehand by symptoms in the form of portents (*utpātas*), that an eclipse cannot occur when five planets combine, and that the direction of the beginning and the end of an eclipse can be guessed by observing the direction

of the spread or otherwise of a drop of oil poured on the surface of water on the preceding eighth lunar day. Varāhamihira refutes all these notions (V.16-17, 18. Cf. Parāśara, Garga and Vṛddha Garga, cited by Utpala). Similarly, the possibility of an eclipse taking place shortly prior to or after the calculated time and its calamitous effects was conceded by earlier writers but is ridiculed by our author (V. 24-25). The six-month periods since the creation and the eclipses occurring therein were believed to be presided over by Brahmā, the moon, Indra, Kubera, Varuṇa, Agni and Yama in a descending order. An eclipse taking place in one or other of these periods was believed to forebode various results, good or bad (V.19-23). The belief that both solar and lunar eclipses taking place in one and the same month foreshadow destruction of kings through open rebellion in their army and bloodshed (V.26) is also found in the *Mahābhārata*. In the Bhīṣmaparvan (3.32-3) both solar and lunar eclipses are said to have taken place shortly prior to the Bhārata war. Similarly, Rāhu eclipsing both the sun and the moon simultaneously is mentioned in the context of the battle between Arjuna and the Saindhavas (Āśvamedhikaparvan, 77.15. Also cf. Udyogaparvan, 143.11). The occurrence of dust storm, heavy dew, earthquake, meteors, variegated clouds, thunder and similar other portents within a week of the termination of an eclipse was taken to be inauspicious, while clear rain was taken to foreshadow prosperity to crops (V.92-6). Similarly, while a solar eclipse occurring after a fortnight of the termination of a lunar eclipse was believed to forebode ill, its *vice versa* was regarded as auspicious (V.97-8).²⁴

Mars, Mercury, Jupiter, Venus, Saturn

Similar results were also attributed to the motion of the five planets, Mars²⁵, Mercury²⁶, Jupiter²⁷, Venus²⁸ and Saturn. It was believed that the towns besieged when Mercury is eclipsed are freed when it emerges from the sun. Others believed that an invading army gets possession of a town when Mercury is seen in the west (VII.19). While Jupiter passing through two or two-and-a-half constellations in a year was supposed to yield good or mixed results, that going through more than this number of stars was believed to destroy the crops (VIII.16). Venus seen before sunset or for the entire duration of the day was supposed to cause fear, famine and diseases, while its sight at mid-day in conjunction with the moon was believed to inspire dissension in the king's army and the town (IX.23). Saturn, in whichever *nakṣatra* it might stay, was believed to bring about calamity to

different countries, peoples, professions and communities (X.1-18). The presence at a time of Jupiter in Viśākha and of Saturn in Kṛttikā, or of both in one and the same constellation was also taken to be calamitous (X.19).

Ketus

The *ketu* or comet is defined as the semblance of fire when there is really no fire except in glow-worms, Piśācas, jewels, etc., which have a fire-like appearance (XI.3). That the time of the appearance and setting of a *ketu* cannot be mathematically calculated and that there are three kinds of *ketu*, i.e., celestial, atmospheric and terrestrial, is stated in XI.2. According to different authorities, *ketus* number 101 or 1000. Nārada held that there is only one *ketu* which assumes manifold forms (XI.5).²⁹ The atmospheric comets are those that are seen on flagstuffs, weapons, houses, horses, elephants and the like; those seen in planets are celestial, and those other than these two are terrestrial (XI.4). The good or bad effects of a *ketu* were determined through its rising and setting, position (the part of the firmament where a *ketu* appears vis-a-vis planets and stars), its contact with planets and stars, smoky matter and colour (XI.6). It was believed that the effects of a *ketu* last for as many months or years as the number of days or months during which it is visible, the effects commencing three weeks after its appearance (XI.7). A *ketu* that is short, slender, clear, glossy, straight, white, appearing for a short time and is followed by rain was regarded as auspicious, while the one with a form quite reverse of the above was called *Dhūmaketu* and considered to be inauspicious, especially when it resembles the rainbow or has 2 or 3 crests (XI.8-9). Similarly, the *ketus* called *Asthiketu* (XI.30), *Kapālaketu* (XI.31), *Raudra* (XI.32), *Calaketu* (XI.33-36), *Śvetaketu* (XI.39), *Raśmiketū* (XI.40) and *Samvarta* (XI.51-2) were believed to yield bad results; those called *Kumuda* (XI.43), *Maṇiketū* (XI.44-5), *Jalaketu* (XI.46), *Padmaketu* (XI.49) and *Āvarta* (XI.50) were believed to forebode prosperity; and those known as *Vasāketu* (XI.29), *Ka* (XI.37-8), *Dhruvaketu* (XI.41-2) and *Bhavaketu* (XI.47-8) were supposed to have mixed effects. The inauspicious *ketus* dimming or touching various stars were supposed to destroy the kings of different countries (XI.53-60). A *ketu* with its crest hit by a meteor or the one visible right from its rising was considered generally auspicious but unfavourable to the Colas, Avagāṇas, white Huns and Cīnas (XI.61). It was believed that a king, invading the countries belonging to an asterism hit by a *ketu* or those situated in the direction where *ketu*'s crest is bent or towards which it is projecting, is sure to obtain victory (XI.62).

Canopus

Canopus (Agastya), if rough, russet, smoky, throbbing, madder-coloured or tiny and being struck by a meteor or a comet, was believed to cause drought, fear, famine, wars, siege of the town, pestilence, etc. (XII.21, 19) while that which shines like gold or silver was supposed to yield contrary results (XI.20).

According to popular belief, various commodities, castes, professions, peoples and other living beings were assigned to one or the other star of the Great Bear (*Saptarṣis*, XIII), constellation (Ch. XV), planet (Ch. XVI) and zodiacal sign (Ch. XL) on which depended their prosperity or scarcity.³⁰ As we have seen above, the growth of crops and the fluctuation of prices were also believed to depend on astrological factors.³¹

The abundance of fruits and flowers in trees was believed to indicate the availability in abundance of various commodities as also the thriving of certain crops (Ch. XXIX). Thus the prospects of *kalama* rice were to be determined from the luxuriance of flowers and fruits in the *sāla* tree; *raktaśālī* from red *aśoka*, so on and so forth.

Various results, good and bad, were also attributed to planetary conflicts, the moon's conjunction with different planets, the years presided over by different planets and planetary triangles (Chs. XVII-XX).

Sandhyā

The interval between the half-setting of the sun and the time of the appearance of indistinct stars and that between the indistinct appearance of the stars and the half-rising of the sun was called *sandhyā* (the juncture). Its effects, good and bad, were ascertained from the movements of wild animals and birds, wind, halo round the sun and the moon, mock sun or moon, *parigha* (cross bar of clouds on the solar disc), tree-shaped clouds, rainbow *Gandharva-nagara* (appearance of a town in the sky), sun's rays, *daṇḍā*³² and dust (XXX.1-2). Thus a wild animal dreadfully crying aloud repeatedly during a *sandhyā* was taken to indicate the destruction of a village, while the same facing the sun, standing to the south of the army' and crying aloud, foreboded annihilation of the army (XXX.3). A flock of wild beasts facing the sun or wind to the left of an army foretold war, while that not facing the sun and standing to the right of an army foreboded

a meeting of the two armies for peace or truce (XXX.4). The birds and beasts crying with their faces turned to the sun at dawn were supposed to indicate the destruction of the country, while the same standing to the south of a town indicated its capture by enemies (XXX.5). The *daṇḍa* seen in the intermediate and cardinal directions was regarded as unfavourable to kings and the four *varṇas* respectively (XXX.16); that seen at the dawn, noon and twilight foreshadowed war and other disturbances (XXX.17). The sudden disappearance of a tree-shaped cloud moving behind a marching monarch foretold his death, while the same in the shape of a small tree indicated the death of the *yuvārāja* and the minister (XXX.19).³³

The conflagration of quarters (*digdāha*), earthquake, meteor (*ulkā*), halo (*pariveśa*) round the luminaries, rainbow (*Indradhanuṣ*), *Gandharva-nagara*, mock sun (*pratisūrya*) and hurricane (*nirghāta*) were also believed to affect the worldly life in various ways (Chs. 31-38). *Digdāha* is a lurid red glow spreading in the sky. A yellow conflagration portended disaster to the king; that having the glow of fire brought ruin to the country (XXXI.1); that which owing to great brilliance creates illumination and reveals shadow like the sun indicated great danger to the king and that having the glow of blood foretold war (XXXI.1).³⁴ Śrīharṣa in his *Naiṣadhiyacarita* (XII.29) mentions *digdāha* as calamitous to kings.

Earthquake

The following beliefs about the cause of an earthquake were current: 1. It is caused by the movement of the huge aquatic animals living in the ocean; 2. it is due to the rest (breath) of the elephants of the quarters tired by the weight of the earth; 3. it is occasioned by an atmospheric wind colliding with another and falling on the earth with sound; 4. it is the result of *adṛṣṭa* (*dharma* and *adharma*, i.e., to indicate good and bad results to the people engaged in meritorious and sinful deeds respectively; and 5. in the 1st, 2nd, 3rd and 4th parts of the day and night the earth is shaken by the Wind, Fire, Indra and Varuṇa respectively in order to reveal good and bad effects (XXXII.1-7; for the enumeration of various effects, cf. XXXII. 8-27). A second quake taking place on the 3rd, 4th or 7th day, at the end of one month or one or three fortnights after the previous quake was taken to be fatal to prominent rulers (XXXII.29).

The *utkās* or meteors were believed to be the forms of the people falling down after enjoying heavenly pleasures (XXXIII.1). It is said that the rays of the sun and the moon formed into a circle by the wind and reflected in the sky with slender clouds become haloes or *pariveśas* with various colours and forms (XXXIV.1). These were taken to be caused by various deities (XXXIV.2-3). The variegated rays of the sun thrown back by the wind in a cloudy sky and assuming the form of a bow are called Indra's bow, i.e., rainbow (XXXV.1). When a wind struck by another dashes against the earth from the sky with a booming sound, it is called *nirghāta* or portentous thunder (XXXVIII.1).

*Utpātas*³⁵

Anything contrary to a natural phenomenon is termed *utpāta* (XLV.1). It was believed that the misdeeds of men result in the accumulation of sins leading to natural disturbances, which are foreshadowed by the three kinds of portents, celestial, atmospheric and terrestrial (XLV.2). These *utpātas* were supposed to be caused by the gods displeased with the wrongful deeds of men, and it was considered to be the duty of a king to perform *śāntis* to avert their evil consequences (XLV.3). The unnatural behaviour on the part of planets, constellations, meteors, thunder, wind and haloes constitutes celestial portents; *Gandharva-nagara*, rainbow and the like atmospheric portents; and the moving objects becoming stationary and *vice versa* form the terrestrial portents. The terrestrial portents, it was believed, can be warded off and the atmospheric ones mitigated by *śāntis*. Some thought that the evil outcome of the celestial portents cannot be averted by any means, while others held that even this can be warded off by certain rites (XLV.4-6). It is not possible to enumerate here all the *utpātas* and their consequences mentioned by our author. A brief reference to some of them, it is hoped, will suffice for our purpose. The breaking, moving, sweating, shedding tears, falling, speaking and the like of a *liṅga*, an image or a temple were taken to be fatal to the king and the country. The falling, breaking, twisting and entanglement of the axle, wheel, yoke and flag of a cart during the procession of a god (*daivata-yāirā*) were also regarded as calamitous to the king and the country (XLV.8-9, 10-17). The presence of flames without fire and *vice versa* were taken to forebode ill to the king and his kingdom (18). The burning of water, flesh and wet objects was taken to foretell the king's death (19). The burning without fire or by lightning of a temple, house, arches, flags and the like is said to indicate foreign invasion after six months (20). The burning, moving, sounding,

rushing out of the sheath, trembling or any other unnatural phenomenon of weapons foretold dreadful war (19, 23). The presence of smoke without fire, dust and darkness during the day, the disappearance of stars in cloudless night and their appearance during the day were also regarded as inauspicious (21). A good tree bearing flowers and fruits without season and the presence of smoke and flame on it were considered fatal to the king (29). The branches of a tree breaking down without any cause, its laughing or weeping (25), trees yielding flowers out of season, the flowing therefrom of milk, wine, blood, honey, oil or water (26-27) and the like were also believed to forebode various evil effects (28, 30-32). An overluxuriant growth of crops and numerous varieties of fruits and flowers on one and the same tree (34), the sesamum seeds yielding half the usual quantity of oil or no oil at all, food losing its taste (35), drought, excessive rain, rain out of season (38); cold in summer and heat in winter, and the seasons not functioning properly (39); the rain of blood, flesh, bones, marrow, corn, gold, tree-barks, fruits, flowers, burning charcoal, dust, stones (without clouds), unnatural animals, milk, clarified butter, honey, curds and hot water (40-3); trees, etc., casting no shadow even when the sun shines brightly, or casting shadow in the same direction as the sun (43); the appearance of rainbow in cloudless sky (44); the rivers changing their courses, the drying up of undrying streams; the rivers carrying oil, blood and flesh and flowing upwards (46-47); the wells producing flames, smoke, foam, weeping sound, shouting, singing and talking (48); water springing up from the earth without digging and a change in its taste and smell (49); women giving birth to monstrosities or two, three, four or more children at a time and delivering long prior or posterior to the usual period; mares, she-camels, she-buffaloes, cows and she-elephants giving birth to twins (51-2); the quadrupeds mating with animals of different species, cows cohabiting with cows and oxen with oxen; a dog sucking a cow (55); a carriage moving without the yoked animal and *vice versa* (59); the sounds of songs and musical instruments heard in the sky; moving objects becoming stationary and *vice versa*; musical instruments producing unnatural sounds (60), or producing sound without being beaten and *vice versa*, or producing multifarious sounds (61); the ox and plough getting entangled; household utensils producing peculiar sounds (62); village-birds roaming in the forest and *vice versa*; nocturnal birds flying during day and *vice versa*; birds or beasts forming circles at the dawn and twilight, or howling in groups facing the sun; hawks weeping and jackals crying facing the sun; a pigeon or owl entering a palace; cocks crying in the evening; cuckoos warbling at the commencement of the dewy season; vultures, etc. flying in a circle

from right to left in the sky; groups of birds sitting on houses, *caityas*, arches and gates; bee-hives, ant-hills and lotus growing in house, etc.; dogs entering houses with bones and other limbs of a corpse; animals and weapons talking like human beings (65-70) and similar other unnatural phenomena were believed to bring about calamities to the king, his country and subjects.³⁶

Āṅgavidyā

Āṅgavidyā or the science of prognostication through the movements of bodily limbs is, as we have seen above, a very ancient science. It is mentioned in early Buddhist, Brāhmaṇical and Jaina works. A detailed treatment of this science is to be found in Puṣpāyariya's Prakrit work *Āṅgaviñjāpāṇṇayam*, assignable to about the fourth century AD. The popularity of this science in Varāhamihira's time is evident from his statement that one well-versed in it is always respected by kings and people (L.44). In prognosticating good or bad results, the prognosticators took note of the direction and the place of the query, the utterances of the questioner, any article brought at the time of the query and the movements of the limbs of the questioner and of others present there (L.1). Proper care was taken to select an auspicious direction, spot and time for the query. A garden or forest abounding in flowers, fruits, shade giving trees, hermitages of saints, Brāhmaṇas and ponds of clean water was considered to be the most suitable spot for this purpose (L.2; for an unsuitable place see L.3-5). The east, north and north-east were considered favourable for a query, while the north-west, west, south, south-east and south-west were regarded as unfavourable. The forenoon is the best, while the dawn, night and afternoon were thought to be inauspicious (L.6). For the purpose of prognostication the limbs were divided into masculine, feminine and neuter genders (L.8-10). The object of the querist's thought or the nature of the query was ascertained by observing the movements of his limbs, the articles and persons present there, the articles seen, held or touched by the questioner and the way he puts his question (L.11-24). In questions relating to thefts, the thieves and whether the stolen objects would be recovered or not were also found out from the bodily movements of the questioner (L.25-28). The nature of the food taken by the querist was determined from his behaviour (L.29-35). In a query concerning pregnancy, the sex, the number of children, the time and the *nakṣatra* of the birth, abortion and the like were determined from the behaviour of a pregnant woman (L.36-43).³⁷ Various effects—good and bad—were also believed to accrue from the position of the pimples (*piṭaka*), ulcers (*vrāṇa*), *tilakas*, moles (*maśaka*), auspicious marks (*lakṣaṇa*) and hairy circles (*āvarta*) on the different parts of the body.³⁸

Signs of Men and Women

From very ancient times, Indians believed in the efficacy of bodily marks. A special class of the interpreters of bodily signs called *sānudravida*³⁹ and *lakṣanajña* (LXVII.89) had come into existence. They are the same as the *lakṣhaṇa-pāṭhakas* of the Buddhist literature. They were highly respected in society (LXVIII.40). They declared one's past as well as future by carefully observing one's height, weight, gait, compactness, vital substances (*sāra*), colour, glossiness, voice, nature, courage, previous birth, parts of the body and shadow (LXVII.1).⁴⁰ Varāhamihira devotes two long chapters to the signs of men (LXVII) and women (LXIX) in general and one to those of the five special types of men and their attendants (LXVIII). We shall indicate here only a few general lines without going into details. It was believed that the mark of a barley-corn in the middle of a man's thumb indicates his richness and that at the bottom of the thumb, sons (LXVII.42). Broad and slender lines at the root of the thumb indicated sons and daughters. The three lines starting from the wrist and touching the forefingers were taken to ensure 100 years' life, while the shorter lines indicated proportionate reduction in age. The lines cut in the middle foretold fall from a tree (LXVII.49-50).⁴¹ According to popular belief, the same three lines reaching the palm make one a king; one whose palm is marked with a pair of fish performs sacrifices; those with diamond-shaped lines become rich; with fish-tail figures, scholars; with lines resembling conch-shell, umbrella, palanquin, elephant, horse and lotus, kings; with the figures of a pitcher, lotus-stalk, flag and goad, rich keeping their treasure-troves underground; with those resembling a rope or *svastika* figure, wealthy; with lines resembling a wheel, sword, axe, *tomara*, *śakti*, bow and spear, army-chiefs; with those like a mortar, sacrificers; those with the figures of a crocodile, flag and store room, very wealthy; those with an altar-like figure at *Brahmatīrtha*⁴² become performers of *agnihotra*; and those with triangular lines and with the figure of a quadrangular well (*vāpi*)⁴³ and temple, perform meritorious acts (LXVII.44-49). In the case of women, a line rising from the root of the little finger and reaching the space between the fore and middle fingers indicated the maximum span of life (*paramāyus*, i.e., 120 years) and shorter lines, proportionate reduction (LXIX.13). The lines at the root of the thumb, as those of men, were taken to stand for progeny, broad ones for sons and slender ones for daughters; the lines not broken in the middle indicated long life for the children and those broken in the middle stood for their short life (LXIX.14).

The line on the palm of a woman starting from the wrist and reaching the middle finger or the one running from the heel to the foot of the toes of a man is said to lead them to royalty (LXIX.12). Most of these beliefs are still current. The popular belief that men with feline eyes are sinners and those with round and crooked ones resembling those of a deer, thieves, is also recorded (LXVII.64-5).⁴⁴ The marks of a *bhṛṅgāra*, seat, horse, elephant, chariot, *bilva* tree, sacrificial post, arrow, garland, earring, chowrie, goad, barley-corn, mountain, flag, fish, *svastika*, altar, fan, parasol and lotus on the soles or palms of women indicate the status of a queen for them (LXIX.10). Similarly, in the case of a man, deep navel, voice and courage; broad breast, forehead and mouth; raised chest, armpits, nails, nose, mouth and the nape of the neck; short genital organ, back, neck and shanks; red eye-corners, feet, hands, palate, lower lip, tongue and nails; thin teeth, fingers, finger-joints, hair, skin and nails; and long jaws, eyes, arms, nose and the space between the paps were believed to stand for kingship (LXVII.84-8).

FIVE GREAT MEN

Varāhamihira, in chapter 68 of his *Bṛhat-saṃhitā*, describes the signs of the Five Great Men (*pañca puruṣāḥ praśastāḥ*). It was believed that the Five Great Men called Haṃsa, Śaśa, Rucaka, Bhadra and Mālavya respectively are born when Jupiter, Saturn, Mars, Mercury and Venus are strong, posited in their own or exaltation signs and in the *lagna*, 4th 7th and 10th houses.⁴⁵ We are told that a man's full strength (*sattva*) is derived from the sun and physical beauty and mental strength from the moon; that his characteristics depend not only upon the planets with which the two luminaries are conjoined but also upon the *rāśis* and their various divisions occupied by them; that upon the particular division of a *rāśi* occupied by the sun and the moon when strong also depend a man's bodily substances (*dhātu*), the five elements (*mahābhūta*), the predominance of one or the other humour of the body (*prakṛti*), lustre (*dyuti*), colour (*varṇa*), the preponderance of one of the three *guṇas*, viz., *sattva*, *rajas*, *tamas*, form and the like; that when these divisions of signs are occupied by the weak sun and the moon, persons of mixed characteristics are born; that good or bad courage (*sattva*), weight and growth (*gurutā*), voice, glossiness (*sneha*) and colour depend upon the excellence or defect of Mars, Mercury, Jupiter, Venus and Saturn respectively; and that persons with mixed characteristics cannot be kings (LXVIII. 3-6).

Mālavya

The Mālavya, we are told, has a nose resembling that of an elephant (i.e. long nose), hands touching the knees, limbs and joints full and fleshy, even and handsome body, slender waist, face 13 *aṅgulas* in height, the ear-lobes 10 *aṅgulas* apart from the chin, shining eyes, beautiful cheeks, equal and white teeth and the lower lip not too fleshy. As his name indicates, he is described as the prospective ruler of the Mālavas, Bharukaccha, Lāṭa, Sindhu and the Pāriyātra mountain; his age is fixed at 70 years (LXVIII.10-12).

Bhadra

Bhadra is said to have fleshy, even and long arms, cheeks covered with soft, short and dense hair, fine skin, strong semen, broad fleshy breast, excessive courage, gait like that of an elephant, beautiful temples and forehead, well-proportioned belly, feet and hands with the lustre of the interior of a lotus, beautiful nose, equal and well-knit brows, smell like that of the earth sprinkled with first rain, cassia leaf, saffron, ichor of an elephant or aloe, dark and curly hair springing one from each pore, the genital organ hidden like that of a horse or elephant, tiger-like face and marks of a plough, *muśala*, mace, sword, conch-shell, wheel, elephant, crocodile, lotus and chariot. His height is said to be equal to his outstretched arms. His weight is fixed at one *bhāra* and the span of life at eighty years. If he is 84 *aṅgulas* tall and weighs a *bhāra*, he becomes the ruler of Madhyadeśa, and if 105 *aṅgulas*, the lord of the entire earth (LXVIII.13-19).

Śaśa

Śaśa, who is said to be a border-chief (*prātyantika*) or vassal (*māṇḍalika*) and to die at the age of 70, has slightly projecting and thin teeth, thin nails, large eye-balls, fleshy cheeks, too much marrow and slender waist, figures of a shield, sword, lute, couch, garland, tabor and spike going upwards on the sole or palm, and is not very stout (LXVIII.20-23).

Haṁsa

Haṁsa has red face shining like gold, plump cheeks, raised nose, round head, eyes like honey, red nails and marks of garland, goad, conch, a pair of fish,

sacrificial implements, pitcher and lotus on the sole or palm; he weighs 1600 *palas*, rules over Khasas, Śūrasenas, Gandhāra and Antardvī, and dies in a forest at the age of ninety (LXVIII.24-6).

Rucaka

Rucaka, described as the lord of the Vindhya, Sahyagiri and Ujjayinī and meeting his death by a weapon or fire at the age of seventy, has beautiful brows and hair, reddish dark complexion, conch-like neck, oblong face, rich blood and flesh, lean knees and shanks and marks resembling parts of a cot, lute, diamond, *śakti* (spear), Indra and trident on his palm or sole; the girth of his waist is equal to the length of the face; he weighs 1000 *palas* (LXVIII. 27-30).

A few remarks are necessary before leaving this topic. Firstly, regarding the height of the Great Men. We are told that the height and girth of the Haṁsa is 96 *aṅgulas*, the height and girth of the Śāśa, Rucaka, Bhadra and Mālavya being obtained by adding three *aṅgulas* successively. Thus the measure for Śāśa should be 99 *aṅgulas*; for Rucaka, 102; for Bhadra, 105 and for Mālavya, 108 (LXVIII.7, 25).⁴⁶ It will be remembered here that the height of the best and the middle-most divine images corresponds to that of the Mālavya and Haṁsa respectively. But these height and girth measures are contradicted by subsequent verses of the same chapter. Bhadra, for instance, is said to measure 84 or 105 *aṅgulas* (LXVIII.18); Śāśa, 92 *aṅgulas* (LXVIII.21); and Rucaka, 100 *aṅgulas* (LXVIII.29). Secondly, many of the above characteristics agree with those of a Buddha. But while according to the Buddhists a personage possessing thirty-two *lakṣaṇas* and 82 *anuvyañjanas* becomes either a *cakravartin* or a Buddha, according to Brāhmaṇical tradition all the Five Great Men turn kings.

ATTENDANTS OF GREAT MEN

The men with mixed characteristics who, as we have seen above, cannot become kings, are also five in number, viz., Vāmanaka⁴⁷ Jaghanya, Kubja, Maṇḍalaka and Sācin. They become attendants of Bhadra, Mālavya, Haṁsa, Rucaka and Śāśa respectively (LXVIII.31).

Vāmanaka

Vāmanaka is said to be of full-grown limbs, hunch-backed, slightly undevel-

oped in thighs, waist and between the armpits, and a devotee of Vāsudeva (LXVIII.32). It is interesting to find the Vāmana (dwarf) holding a parasol over the king's head on the Chatra type coins of Candragupta II,^{47a} the Elephant-Rider,⁴⁸ the Elephant-Rider Lion-Slayer⁴⁹ and Chatra⁵⁰ types of Kumāra Gupta, and on the Chatra type of Skandagupta.⁵¹ It seems that the Gupta mint-masters intended to portray their emperors as the Bhadrā Mahāpuruṣa⁵² who is said to be the king of Madhyadeśa and a universal ruler (*sakalāvanināthah*), a description which suits well the Gupta rulers. It is quite likely, therefore, that the tradition about the five types of men and their attendants recorded by our author was current long prior to his time and that the art convention of depicting the umbrella-bearer as a dwarf originated in this tradition.

Jaghanya

Jaghanya, the attendant of Mālavya, has crescent-like ears, good joints, thick semen, rough skin, thick fingers and marks of a sword, *śakti*, noose and *paraśvadha* on his breast, feet and hands, and is copper-coloured (LXVIII.33-4).

Kubja

Kubja, who attends on Hamsa, is said to be free from defects in the lower part of his body but is slightly slender and bent in the upper part (LXVIII.35-6)

Maṇḍalaka

Maṇḍalaka, the attendant of Rucaka, appears old and his hairs are hard and rough (LXVIII.37-8).

Sācin

The body of Sācin, the attendant of Śaśa, is said to be very ugly (LXVIII.39)

Wearing New Clothes

It was believed that a new cloth put on in one or other *nakṣatra* yields good or evil results (LXX.1-7). The four corners of a cloth, couch, seat or footwear, it is stated, are inhabited by gods; the two middle parts of the broad sides,

by men; and the remaining portions by devils (LXX.9)⁵³ When a cloth is smeared with collyrium or dung or mud and the like, is cut, burnt or torn in the portions allotted to devils, it bodes disease or death to the wearer; in those allotted to men, power and birth of sons; and of gods, prosperity (LXX.10-11, 12-13). The popularity of these beliefs is indicated by the fact that they are mentioned in the Jaina *Uttarādhyayana-sūtra*⁵⁴ also.

Particular *nakṣatras*, *tithis*, *karaṇas* and week-days were considered especially auspicious and are, therefore, recommended for different kinds of acts (XCVII-XC,X, CIII.61-3). The *nakṣatra* and the position of a planet in the different divisions of a *rāśi* at the time of one's birth were believed to mould one's life, physical and mental constitution, habits, likings, etc. (Chs. C, CIII).

Śākunas

As many as eleven chapters of the BS (LXXXV-XCV) are devoted to the *śākunas* or indications of future events in the life of a human being derived from the movements of birds and animals, especially during a journey. The philosophy behind the belief in the efficacy of omens is that an omen indicates the fruition of one's good and bad deeds in a previous life.⁵⁵ Thus the events revealed by birds and animals were regarded as the outcome of a man's deeds in a previous life, and omens had only an indicative value. During the three-hour periods from sunrise to sunrise, different directions were called *mukta-sūryā*, *prāpta-sūryā* and *eṣyat sūryā*; these were also known as *aṅgārīṇi* (sparkling), *dīptā* (burning) and *dhūminī* (smoking) respectively; the effects of an omen occurring in these quarters were taken to have been already exhausted, to be experienced on the same day and pending up respectively; the remaining quarters were styled *śānta* (tranquil, LXXXV.12-13). An omen occurring nearby and at a lower level bore fruit shortly, whereas that occurring far off and at a higher level in distant future. The growing or decaying nature of the object whereon an omen is perched was also taken into consideration. The effects of an evil omen on a growing object like a tree, for instance, would be quite negligible, but that of a good omen, very great; on the contrary, an evil omen on a decaying object would be very effective (LXXXV.14). An omen appearing in malefic *muhūrtas*, *tithis*, stars, when a strong opposite wind blows, and facing the sun was regarded as blasted by divine agency (*deva-dīpta*), whereas it was considered to be blasted by action (*kriyā-dīpta*) if it had untoward gait (running towards lightning, meteor, sun and

wind), position (sitting or standing in an inauspicious place), disposition, voice and bodily movements. Likewise, an omen contrary to the above would be regarded as *śānta* (tranquil, LXXXV.15-6). The *śānta* and *dīpta* omens were believed to bode good and evil respectively. The diurnal and nocturnal creatures moving during their own time on mountains (or lofty spots) and water respectively are said to be strong. Of hermaphrodites, female and male creatures, each is stronger than the preceding ones (LXXXV.18). When two omens are seen simultaneously, the one that has superior speed, species, power, position, jovial mood, courage and voice and is in its own place is strong, whereas one deficient in these respects is weak (LXXXV.19). Rural creatures found in forests and *vice versa*, and diurnal ones at night and *vice versa*, were not taken into account. Similar is the case with the creatures that are in pair, diseased, afraid, desirous for fight or meat and separated by a river or intoxicated (LXXXV.24-5). The movements of creatures in their respective mating seasons were also not taken into consideration (LXXXV.26-8). The omens regarded as auspicious in different quarters and occurring to a traveller's left or right, in front or behind are mentioned (LXXXV.20-23 37-8, 43-7). The space intervening between the eight directions is divided into thirty-two parts and people following various professions are assigned to them. An omen standing and crying in a particular direction and at a particular place, when a person is standing still or going on a journey, is taken to foreshadow his meeting with the individual belonging to that place (LXXXV.29-35, 68ff.). A bird crying in a tranquil direction was believed to foreshadow the arrival of a person or gain, whereas that crying in a blasted direction indicated meeting with an undesirable person or calamity.⁵⁶ The rules for the interpretation of omens at the time of an act, meeting, battle, seeing a king, entering his palace or forest, dipping into a river and so on are summarised in LXXXV.47ff. The blasted and tranquil sounds of different birds and animals and their supposed effects are described in Chs. LXXXVII and LXXXIX. While interpreting an omen, the relative strength of the particular quarter, place, movements, sound, weekday, star, *muhūrta*, *horā*, *karaṇa*, the Ascendant, its division, its being moveable, fixed or dual sign were also taken into consideration.⁵⁷ The results accruing from the movements of dogs, wild animals, cows, horses, elephants and crows are also recorded.⁵⁸

A noteworthy feature of Indian life through the ages is the persistency of beliefs and superstitions, and omens are no exception. The idea, for example, that a

dog entering a house with a dry bone into its mouth,⁵⁹ or barking facing the sun (LXXX-VIII.2) or during the night (LXXXVIII.5) bodes evil, still persists. The belief that crows assembling in a town or village without any apparent reason foreshadow evil (XCIV.8) is still preserved. Similarly, sneezing was, as now, regarded as inauspicious (XCIV.60).

Our author frequently alludes to the objects the sight of which was regarded as auspicious at the commencement of a journey.⁶⁰ According to the *Yogayātrā* (XIII.10-2), they included such articles as white mustard seeds, mirror, milk, collyrium,⁶¹ jar filled with flesh, head-gear (*uṣṇīṣa*,) *bhṛṅgāra*, *vardhamāna* symbol, conveyance, lute, parasol, curds, honey, *ghee*, *rocanā*, flag, gold, lotus, throne, conch-shell, white bull, flowers, cloths, fish, kindled fire, fruits, *akṣata*, sugarcane, edibles, clay, goad, *cāmara*, weapons and precious stones. The sight of a virgin, a nicely clad Brāhmaṇa, prostitute, travellers and elephants was also regarded as auspicious. If these objects were not seen without any effort, they were to be brought and shown to a traveller or a marching king (YY, XIII.13; TY, IX.3).

Agni-lakṣaṇa

In fire-worship, the priest was invariably associated with the *sāmvatsara*.⁶² While the former offered oblations into fire, the latter interpreted omens. The fire that is fragrant, glossy, thick and full of flames, has the shape of auspicious objects such as a banner, pitcher, horse, elephant or mountain, is hued like gold, *asoka*, *kuraṇṭaka* and lotus flowers and beryl or blue lily, produces the sound of a chariot, ocean, cloud, elephant or drums, and smells like elephant's ichor, earth, lotus, fried rice, *ghee* or honey was regarded as auspicious (XLII.31, 33-6). It is said that if at the conclusion of fire-worship, the fire blazes forth of its own accord, is glossy and its flames turn to the right (*pradakṣiṇāsikha*), it indicates victory to the king (XLII.32)⁶³

Notes and References

1. V.R. Pandit, "Omens and Portents in Vedic Literature," *Proceedings of the All-India Oriental Conference*, Nagpur Session (1946): JUB, XXVI, Pt.ii, pp.76ff.
2. III.2-53; I.4-39; IV.3-73 Cf. V.S. Agrawala, *India as Known to Pāṇini*, pp.336-37.
3. II.p.19; II.8,9, 10.

4. II.11
5. II.12.
6. II, p.84; II.16
7. II, 15, 22.
8. II. p.73; II.12, 20.
9. II. 10, 19.
10. II, p.74.
11. II.6, 20, 8.
12. II.22, 11.
- 12a. Cf. *Mahābhārata*, II.542.
13. *Arthaśāstra*, IX-4; V.3
14. Engl. Tr. by Rhys Davids, pp.16-18 and notes.
15. Mehta, *Pre-Buddhist India*, p.327.
16. *Āṅgavijjā*, Introduction by Moti chandra, p.35.
17. Also cf. *Manu*, III.162.
18. II, pp.19-21.
19. II.4 For exaltation of the astrologer, cf. II, 3, 5, 7, 9, 12, 13, 14, 21.
20. कुहकावेशपिहितैः कर्णोपश्रुतिहेतुभिः।
कृतादेशो न सर्वत्र प्रष्टव्यो न स दैववित्।

Cf. Utpala—कुहकेनेन्द्रजालेन प्रतेनादिकेन आवेजेन देवतादिदेहप्रवेशेन पिहितः प्रच्छन्नोऽदृश्यशरीरः। कुत्रचित्सुषिरे भित्त्यादिके अभ्यन्तरस्थितयाऽव्यक्तया वाचा सम्भाषते। एतैः कुहकावेशपिहितैः। तथा कर्णोपश्रुत्या कश्चिन्मन्त्रविशेषं जपतः कर्णे यथेष्टं कथयति लोके कर्णोपश्रुतिविकेति प्रसिद्धा अथवा प्रष्टारो यत्रोपविष्टाः स्थितास्तन्मध्ये आत्मीयं शिशुं विसृज्य तेषां कथां परस्परं क्रियमाणामाकर्ण्य विवृणोति यथा वस्येदमभिज्ञानं तस्य भवता इदं वक्तव्यमिति हेतुना तर्कणाशयं बुद्ध्वा।

21. I.e., the days other than the 8th and 14th of each fortnight of a lunar month and the full and new moon days.
22. Cf. *Pārāśara* cited by Utpala.
23. The story under reference may be briefly summarised as follows:—
Being angry at the untimely request of Simhikā for a son, Kaśyapa gave her a dreadful son who came to be known as Rāhu. Immediately after his birth, he fought a battle in which he was defeated by Aditi's sons. Enraged at this, he performed severe penance and secured from Brahmā a boon conferring on him the status of a planet, immortality, victory over the gods and the power to devour the sun and the moon. But Viṣṇu chopped off his head by his discus and said, 'Let Brahmā's words be true: in your own period you may eclipse the

two luminaries and thus indicate good and bad things for the world.' Cf. Parāśara cited by Utpala on V.2.

24. The effects of an eclipse, which differed from country to country and community to community, were believed to depend on such factors as the sun and the moon rising or setting being eclipsed (V.27), an eclipse taking place or ending in different parts of the day (V.28-31), different directions or *ayanas* (V.32-4), the various zodiacal signs occupied by the two luminaries at the time of an eclipse (V.35-42), the month in which an eclipse takes place (V.69-80), the form (for different names, see V.43-52) and colour (V.53-9) of the eclipse, and the different planets aspecting the sun and the moon when eclipsed (V.60-62). For other details, see V. 63, 81-91. Similar effects were expected from the eclipse of other planets (V.64-8).
25. For the different names of Mars beginning its retrograde motion in different planets, see VI.1-5.
26. For various names of Mercury's course through different stars, *vide* VII.8-13; for different kinds of its motion, see VII.15-16.
27. For various results attributed to the years of Jupiter's cycle, *vide* VIII.1-14, 20-52.
28. For the nine *vīthis* and six cycles of Venus, *vide* IX.19, 10-22.
29. For the enumeration of 1000 *ketus*, see XI.10-28.
30. For the assignment of countries and peoples to *nakṣatra*-triads, see *supra*, Ch.II, Section.1.
31. *Supra*, Ch.V. Section 4.
32. The collection of the sun-beams, clouds and wind assuming the form of a staff was called *daṇḍa* (XXX.16).
33. See also XXX.23, 25, 27-9, 30. For the time of these effects, see XXX.31.
34. See also XXXI 3-5.
35. Cf. *Āṅgavijjā*, Ch. 53.
36. Also see XLV 73-80. For enumeration of natural phenomena not regarded as *utpātas*, see XLV. 81 ff.
37. Utpala regards Chap. 50 on *Āṅgavidyā* as spurious:—*Ataḥ param kecid=āṅgavidyām paṭhanti*; but as *āṅgavidyā* is included by Varāhamihira himself in the contents of a *Saṁhitā* (Ch.II, p.73), there is nothing to support Utpala's view.
38. Like the previous chapter, even Ch. 51 on *Piṭaka-lakṣaṇa* is declared by Utpala to be spurious: *Ataḥ param=api kecit piṭaka-lakṣaṇam paṭhanti, tad=apy=asmābhīr=vyākhyāyate*; but Varāhamihira mentions it as one of the topics dealt with in a *Saṁhitā* (Ch.II, p.73).

39. LXVII.1. *Samudra* seems to have been a standard treatise on this subject. Utpala:—*Samudre proktaṁ puruṣa-lakṣaṇaṁ sāmudraṁ tad-vretti jānāt-iti sāmudravit.*
40. Cf. *Āṅgavijjā*, Ch.37.
41. For other beliefs about lines, see LXVII.44-9.
42. LXVV.48. The root of the thumb is called *Brahmatīrtha*. Utpala explains it by 'maṇi-bundhanasy-opari Brahmatīrtham-aṅguṣṭhamūle.' Cf. *Viṣṇudharmasūtra*, LXII.1-4; *Vasiṣṭha-dharmasūtra*, III.64-8; *Baudhāyana-dharmasūtra*, I.5.14-8; *Yājñavalkya-smṛti*, I.19. For a detailed account of the various parts of the palm called *tīrtha*, see *HDS*, II, i, pp.316, 652-3.
43. LXVII.49. Utpala explains *vāpī* by 'vāpī prasiddhā catur=asrā puṣkariṇī.
44. For other beliefs regarding eyes, see LXVII.64-7.
45. ताराग्रहैर्बलयुतैः स्वक्षेत्रस्वोच्चगैश्चतुष्टयैः ।
पंच पुरुषाः प्रशस्ता जायन्ते तानहं वक्ष्ये ॥
जीवेन भवति हंसः सौरेण शशः कुजेन रुचकश्च ।
भद्रो बुधेन बलिना मालव्यो दैत्यपूज्येन ॥

LXVIII.1-2

Cf. *Raghuvamśa* III.13

46. We shall naturally be asked to explain how the height and girth of the different classes of men can be the same. As pointed out by Utpala, the equality of the height and girth was obtained by measuring the latter from the tip of the middle finger of one hand to that of the other, both arms being fully outstretched (*prasārīta-bhuja-dvayasya pramāṇam=ity=arthah*). This is one of the most important *Mahāpuruṣa-lakṣaṇas* and called *Nyagrodha-parimaṇḍala* type in the following couplet of Parāśara cited by Utpala : तथा च पराशरः ।

उच्छ्रायः परिणाहस्तु यस्य तुल्यं शरीरिणः ।
स नरः पार्थिवः ज्ञेयो न्यग्रोधपरिमण्डलः ॥

Varāhamihira says the same thing while describing the characteristics of the Bhadra (*bhuja-yugala—pramitaḥ samucchraya=sya*, LXVIII.13).

47. Vāmana and Kubja are mentioned as royal attendants by Kauṭilya (I. 21.1) also,
- 47a. A.S. Altekar, *Coinage of the Gupta Empire*, Pl. VIII.6-15.
48. *Ibid.*, XII.14-15.
49. *Ibid.*, XIII.1-2.
50. *Ibid.*, XIII.15
51. *Ibid.*, XIV.14
52. Cf. R.C. Kar, "A New Interpretation of the Gupta Chhatra and Battle-axe coin-types," *JNSI*, VI (1944), pp.27-33; "The Vāmana—Attendant on Gupta Coins", *IHQ*, XXIV (1947), pp.113-22. For an adverse opinion, see Altekar in *JNSI*, VI, pp.32-33.

53. The following chart from Utpala explains this division:—

Devāḥ	Rāksasāḥ	Devāḥ
Narāḥ	Rākṣasāḥ	Narāḥ
Devāḥ	Rākṣasāḥ	Devāḥ

54. J.C. Jain, *Life in Ancient India as Depicted in the Jain Canons*, p.237.

55. अन्यजन्मान्तरकृतं कर्म पुंसां शुभाशुभम्।
यत्तस्य शकुनः पाकं निवेदयति गच्छताम्।

LXXXV.5.

56. Ch.LXXXVI.

57. Ch.XCV.

58. Chs. LXXXVIII, XC-XCIV.

59. Śuṣkeṇa c-āsthā gr̥hītena mṛtyuḥ; praviśati tu gr̥ham saśuṣk-āsthi-vaktre pradhānasya tasmin vadhaḥ; LXXXVIII.1.

60. *Prāsthānika-maṅgala*, XLII.12; LVIII.1

61. The printed ed. of YY, XIII.10 reads 'Siddhārthak-ādarśa-prayojanāni' which gives no sense. We have therefore preferred 'Siddhārthak-ādarśa-payo=ñjanāni' given by Utpala on LVIII.1.

62. XXII.30; XLIII.13; XLVII.78, 80.

63. Cf. *Raghuvamśa*, IV.25.

Architecture and Fine Arts

Section I : Residential Architecture

379-94

Vāstu; Overall Measurements; Proportionate Measurements—*Śālā* and *Alinda*; *Vithikā*; *Bhūmis*; Walls; Doorways; Columns; *Catuśśālaka*; *Triśālaka*; *Diśālaka*; Selection of the Site; Castes and Site; Site-plan (*Pada-vinyāsa*); *Vāstunara*; Stone-laying Ceremony; *Vajralepa*; *Vajratala*; *Vajrasaṅghāta*; Ceremonials and Beliefs; *Sthapati*.

Section II : Temple Architecture

394-403

Prāsāda; The Site; Site-plan; Measurements; Decorative Features; Temple-types

Section III : Sculpture, Music and Painting

403-12

Sculpture. Materials; Classification; Iconometry; Table of Measurements.
Music. Vocal and Instrumental Music; *Svaras* and *Grāmas*; Musical Instruments; *Ḍiṇḍibhāṇḍa*.
Painting.

Notes and References

412-28



From Varāhamihira's works we get an excellent idea of various facets of fine arts as practised during his period. He gives a good account of architecture, both secular and religious, sculpture and iconometry which he has dealt with in separate chapters. We also get some idea of other aspects of fine arts including music and painting from casual references scattered through his works.

I

RESIDENTIAL ARCHITECTURE

The art of building had reached a high pitch of development in the Gupta age. Two distinctive styles of architecture, to wit, Nāgara and Drāviḍa, made their appearance precisely during this period. Though several specimens of temple

architecture of the period under review are preserved, we know very little, if anything, about residential architecture. As older works dealing with residential architecture are no more extant, great interest attaches to the Vāstuvidyā section of the *Bṛhatsamhitā* (Ch.52) contents whereof are discussed below.

Vāstu

The word 'vāstu' literally means 'a place of residence'. In Sanskrit lexicons, it denotes a house-site and a house proper.¹ In the *Arthaśāstra*, it has a wider connotation covering a building-site, gardens, *setubandha*, a tank and a base.² Vātsyāyana (I.3.16) regards Vāstuvidyā as one of the sixty-four arts and his commentator Yaśodhara states that this science is useful in constructing a house. Varāhamihira uses 'vāstu' in the strictly limited sense of a residential building (LII.1, 11, 15, 22, 31, 37; LV.9; CVI.6). In later times the connotation of *vāstu* was extended so as to include not only a house-site and a house, but also furniture, conveyances and sculpture.³

Overall Measuremets

Varāhamihira first gives overall measurements for five kinds of houses meant for a king, army-chief (*senāpati*), ministers (*saciva*), queens (*mahiṣī*), crown-prince (*yuvarāja*) and his younger brothers, feudatory chiefs (*sāmanta*), state officials (*rājapuruṣa*), chamberlain (*kañcukin*), royal courtesans (*veśyā*) and artistes (*kalājña*), envoys (*dūta*), astrologers, priests and physicians, persons belonging to the four primary castes and sub-castes, treasury and pleasure-house (*rati-bhavana*).

The five houses of a king measured 108, 100, 92, 84 and 76 cubits in breadth, the length being greater than the breadth by a quarter (4).⁴ The same measures are found prescribed in the *Matsya-purāṇa* (CCLIV. 14-16). An army-chief had five houses, 64, 58, 52, 46 and 40 cubits broad, their length being 1/6th more than the breadth (5).⁵ The best house of a minister measured 60 cubits in width, while the remaining four were less by 4 cubits each in a descending order, the length exceeding the breadth by 1/8th (6.Cf. *Matsya*, CCLIV. 20-21). For a crown-prince are prescribed five houses, 80, 74, 68, 62 and 56 cubits broad, the length being 1/3rd more than their width. The dimensions of the houses of his younger brothers are half of those of the *yuvarāja* (7.Cf. *Matsya*, CCLIV.17-8). The measures for the houses of feudatory chiefs and high state officials (*pravara-*

rājapuruṣa) are equal to the difference between the houses meant for the king and his minister. Thus the best house of this class measures 48 *hastas* x 67 *hastas*, 12 *aṅgulas*. The difference between the houses of a king and his crown-prince gives the dimensions for the houses of chamberlains, royal courtizans and artistes. The largest house of this group should thus be 28 *h.* x 28 *h.* 8 *a.* (8).⁶ Of the five houses meant for the royal astrologer, priest and physician, the first measured 40 cubits in breadth, the width of the remaining four houses decreasing by 4 cubits each in a descending order and their length being greater than the breadth by 1/6th (10). The residence of the officer-in-charge of workshops (*karmāntādhyakṣa*) and of the envoys corresponded to the difference between those prescribed for the crown-prince and the minister (*Yuvarāja-mantri-vivaram* *karmānt-ādhyakṣa-dūtānām*, 9). According to another reading (*mantri-sāmanta-vivaram*) given by Utpala, they equalled the difference between the houses of ministers and feudatory chiefs, thus giving 12 cubits for the width of the best structure of this group whereas we do not get any satisfactory measure for length; consequently as pointed out by Utpala himself, this reading was rejected by reputed architects (*etad=vrddha-sthapatibhir=n-ādṛtam=atimānālpavād=iti*).⁷ The difference between the measures of the residences of a king and his commander gives us the dimensions of treasure-house and pleasure-house as also for the houses meant for superintendents of state departments (*Nṛpa-senāpati-grhayor=antara-mānena koṣa-rati-bhavane*, 14; *Adhyakṣ-ādhyakṣānām sarveṣām koṣa-rati-tulyam*, 9)⁸ The best structure of this class is thus 44 *h.* x 60 *h.* 8 *a.* The antiquity of this architectural tradition is vouchsafed by the *Kauṭīliya* according to which the dimensions of *vāsa-grha* should be the same as those of *koṣa-grha* (*koṣa-grha-vidhānena vāsa-grham*, I.20). It was often placed on the upper floor of a house and used as the bed-chamber of the couple. In Bāṇa's *Harṣacarita*⁹ and *Kādambari*¹⁰ is to be found a beautiful description of *vāsa-grha*, and in an Ajanta fresco we see a newly married couple celebrating their honeymoon.¹¹

The five houses of the members of the four *varṇas* measure 32, 28, 24, 20 and 16 cubits in width. A Brāhmaṇa could have all the five houses; a Kṣatriya, last four; a Vaiśya, last three; and a Śūdra, last two. The length of the houses of the four *varṇas* exceeds the breadth by 1/10th, 1/8th, 1/6th¹² and 1/4th in a descending order. People from the lowest sections of society were to have houses with smaller dimensions (12-13). Houses with various measures are prescribed for state officials in accordance with their caste. According to a general rule

laid down for the purpose, a royal officer was to have houses with dimensions equal to the difference between those of the houses of an army-chief and those prescribed for the caste to which he belonged (14 Cf. *Matsya*, CCLIV.31). Thus the first house of a Brāhmaṇa officer would measure 32 *h.* by 35 *h.* As for the houses of a Kṣatriya officer, measures could be obtained by subtracting the dimensions prescribed for his caste from those of the 2nd, 3rd, 4th and 5th houses of any army-chief; for those of a Vaiśya, by subtracting from the 3rd, 4th and 5th; and for those of a Śūdra, by subtracting from the 4th and 5th.¹³

Persons of mixed castes like Pāraśava could have houses with dimensions equal to a half of those prescribed for both of his parents put together (15). Thus the first house of a Pāraśava would be 26 *h.* wide. According to the *Matsya-purāṇa*, however, a member of the mixed castes should have houses equal in dimensions to those of this father's (*Antara-prabhavāṇām ca svapitur=grham=isyate*, CCLIV.32)

There was no fixed rule as to the size of the cattle-sheds, residences of ascetics, granary, armoury, a structure for keeping sacrificial fire ablaze and pleasure-house (16). There is a discrepancy between this verse and LII.14 according to which the pleasure-house (*rati-bhavana*) should be equal in dimensions to the difference between the houses of a monarch and his commander, indicating that deviations from the prescribed dimensions were occasionally allowed.

Besides the proportionate length of individual houses noticed above, it is laid down that the length of a structure consisting of a single room (*śālā*) should be twice its breadth. Normally, the height of a building was required to be equal to its width (11). Thus the first royal house should be 108 *h.* high; but a height of more than 100 *h.* was not approved of by writers on architecture (*Necchanti śāstrakārā hasta-śatād=ucchritam parataḥ*, 16). So far about overall measurements.

Proportionate Measurements—Śālā and Alinda

Proportionate measurements for different parts of a structure are laid down in detail. A peculiar method of obtaining measures for the hall (*śālā*) and the balcony (*alinda*)¹⁴ in all the houses except those of the four castes was to add 70 to their width and place the sum total separately at two places and then to divide one by 35 and the other by 14. The two quotients give measures for the *śālā* and *alinda* respectively (17). As for the five houses of the four castes, the

śālā in a descending order measured 4 h. 17a., 4 h. 3 a., 3 h. 15 a., 3 h. 13 a. and 3 h. 4 a. Measures for the *alinda* are 3 h. 19 a., 3 h. 8 a., 2 h. 20 a., 2 h. 18 a., and 2 h. 3 a.¹⁵

Vīthikā

Outside the house was to be made a pathway (*vīthikā*), its width being 1/3rd of the *śālā* (*Śālā-tribhāgatulyā kartavyā vīthikā bahir-bhavanāt*, 20). The *Viśvakarma-prakāśikā* lays down the same rule in almost identical words, evidently borrowed from the *Bṛhat-samhitā* (*Śālā-tribhāga-tulyā ca kartavyā vīthikā bahiḥ*). The location of the *vīthikā* formed a basis of the classification of dwellings. Thus a structure was called *Soṣṇīṣa*, *Sāyāśraya*,¹⁶ *Sāvaṣṭambha* and *Susthita* according as there was a pathway to its east, west, south or north, and on all sides respectively (20-21).¹⁷ According to the *Śukranīti* (I.267), the *vīthi* was placed behind the house and used as a passage for sewage (*Gṛha-prṣṭhe sadā vīthir=mala-nirharaṇa-sthalaṃ*).

Bhūmis

In a house consisting of more than one storey, the height of the ground-floor should be 1/6th of the width with an addition of four cubits, and the height of each of the following upper storeys (*bhūmi*) should be diminished by 1/12th of the preceding one (22).

Walls

Much stress was laid on the strength and stability of a house, and it is laid down that in thickness walls should be equal to a 16th of the total breadth (23).¹⁸ Thus the walls of the first royal house would be 6 h. 18 a. thick. According to the *Śukranīti*, however, the thickness of the wall should be equal to a 6th of the width of a room (*Koṣṭha-vistāra-saṣṭh-āṃśa-sthūlā sā ca prakīrtitā*, I.229).

Door-way

The breadth of the houses of the king, army-chief and others (except those of the four castes) increased by an 11th and with an addition of 70, when turned into *aṅgulas* gives the height of the door-way, and a half of that its width (24). For the four-caste houses, the width of the door-way could be obtained by adding 18 digits to a 5th of their breadth taken as *aṅgulas* and then again adding to it 1/8th of itself; three times this would be its height (25).¹⁹ The thickness of the two side-frames (*śākhā*) of a door is as many *aṅgulas* as its altitude numbers

in cubits; $1\frac{1}{2}$ that measure gives the thickness of the threshold and the upper block (*udumbara*, 26).²⁰ $1/80$ th of seven times the height gives the breadth of all the four pieces (27).

The door was normally placed in the middle of the front wall and faced a cardinal point and never an intermediate direction (LV.10). This is also clear from the fact that in the plans of both 81 and 64 squares architects are often asked to place the door in the central plots of outer bands and not on corners (69-73). With a view to prevent obstructions (*vedha*) to light and air and to provide hygienic conditions it is laid down that the door should not face a road, tree, corner, well, pillar, mud, god (temple), a Brāhmaṇa's house and a water-sluice.²¹ But in view of the difficulty of avoiding all these obstructions in densely populated towns and villages, it is recommended that the minimum distance between the door and the obstructing object should be twice the height of the door (74-76). Further, the door should not be such as opens or closes by itself, is larger or smaller than the prescribed dimensions, one above another, too narrow or broad, bent, pressed hard by the upper block, bent inward or outward, and stands in a haphazard direction. All these defects were believed to augur evil to the landlord or family members (77-79).²² The main door (*mūla-dvāra*) was embellished by auspicious decorative designs like a pitcher, a *bilva* fruit, foliage and boughs and the Pramathas.²³ It was seen that in beauty the main door is not outdone by side doors (80). According to the *Matsya-purāṇa* (CCLV.18-19), the main door was to be worshipped daily by offerings, *akṣata* and water. The practice of drawing auspicious figures on door-jambs is even now followed.

Columns

We also get proportionate dimensions and mouldings of the column. Its width at the bottom should be equal to $1/80$ th part of nine times its height, and the same decreased by $1/10$ th is its width at the top (27).²⁴ These measures are meant for the columns supporting the upper storey or roof and not for free-standing columns to which also they can be applied with some minor changes. We are asked to divide the entire height of a pillar into nine parts, the pedestal (*Vahana*) being the lowest. The second part immediately above the *Vahana* was *Ghaṭa*, evidently because it was shaped like a pitcher.²⁵ The eighth part at the top resembled a lotus flower and was consequently known as *Padma* or *Kamala*, the ninth part immediately above the *Padma* being called *Uttaroṣṭha* or the Upper

Lip.²⁶ Between the two lower and two upper parts was the shaft which occupied five of the nine divisions. Utpala informs us that according to another interpretation, *Uttaroṣṭha* formed the eighth part and *Padma* the ninth. He also tells us that *Uttaroṣṭha* was carved with various decorative figures (*rūpaka-viśeṣa*) and that the lower parts were sometimes worked in gold.²⁷ Pillars were given various names in accordance with the shape of the shaft. Thus a column was known as *Rucaka*, *Vajra*, *Dvivajraka*, *Pralīnaka* and *Vṛtta* according as its shaft was rectangular, octagonal, 16-sided, 32-sided and circular (28.Cf. *Matsya*, CCLV.2-3). The *Matsya-purāṇa* calls these five columns *mahāstambhas* and informs us that they were decorated with the designs of lotuses, creepers, pitchers, foliage, mirrors, etc. (*Ete pañca mahāstambhāḥ praśastāḥ sarva-vāstuṣu, Padma-vallī-latā-kumbha-patra-darpaṇa-rūpitāḥ*, CCLV.4).

Above these columns were horizontally placed the architraves known as *Bhāratulās* whose number depended on that of the columns. Their thickness was the same as that of the pillars. Above these were placed cross-beams called *Tulopatulā* the thickness of which is lessened by a quarter. According to another interpretation, cross-beams were known as *Upatulā* and above them were placed minor beams or rafters called *Tulopatulā* and their thickness was lessened by a quarter of the immediately preceding one.²⁸ The *Matsya-purāṇa* (CCLV.5-6) knows only two beams, *Tulā* and *Upatulā*, probably standing for the *Bhāratulā* and *Tulopatulā* of our work, the *Upatulā* diminishing in width by 1/3rd or 1/4 of the thickness of the pillar.²⁹ This shows the correctness of the former interpretation.

There is, however, much controversy about the interpretation of these verses. Kern characterised them as 'exceedingly vague'. According to P.K. Acharya, eight components of a pillar are referred to here, to wit, 1. *Vahana*, 2. *Ghaṭa*, 3. *Padma*, 4. *Uttaroṣṭha*, 5. *Bāhulya*, 6. *Bhāra*, 7. *Tulā*, and 8. *Upatulā*.³⁰ Acharya has definitely erred in taking '*bāhulya*' to be a moulding. Utpala (on 30) rightly takes it to mean thickness or depth and Varāhamihira himself has used the word in this sense (LII.26). Had *bāhulya* been a moulding, it must have been referred to in a similar verse from the *Kiraṇākhyatantra* quoted by Utpala³¹ and in the relevant verses of the *Matsya-purāṇa* which is not the case. *Bhāra* and *Tulā* are not separate names, but form parts of one word—*Bhāratulā*, which as we have seen, is the same as the *Tulā* of the *Matsya-purāṇa*. T. Bhattacharya³² is also wrong in regarding *Bhāratulā*, *Tulā* and *Upatulā* as mouldings of pillars. It is evident from

Bhaṭṭotpala's commentary that *Bhāratulās* were placed above the column horizontally (*tiryak*), not vertically. *Tulopatulā* or *Upatulā* did not form parts of a column. Kern appears to be right in taking the three words to mean architrave, superior cross-beams and upper rafters which are even now used. *Bhāratulās* were meant to support a heavy roof (*bhāraṁ tolayantīti bhāratulāḥ*). Thus only five mouldings of columns are referred to in our work, viz., 1. *Vahana* or *Udvahana*, 2. *Ghaṭa*, 3. *Shaft*, 4. *Padma* and 5. *Uttaroṣṭha*. Roughly speaking, they correspond to the base, pedestal, shaft, capital and abacus or crowning figures.

These details possess an unusual interest inasmuch as they throw welcome light on the evolution of the 'Gupta order'. Generally speaking, the free-standing Aśokan columns consist of two parts, viz., monolithic, circular and slightly tapering shaft and the capital. The shaft arises abruptly from the ground without any suggestion of the base, and the capital with inverted longitudinal lotus petals is often described as a Persepolitan bell and is crowned by animal sculpture in the round. In the 2nd-Ist century BC, the pillar-making technique undergoes a marked change in that 'more attention was paid to the embellishment of the bases of the pillars than to the capitals.' Thus at Bedsa, we come across the vase-shaped base, corresponding to our *Ghaṭa*, from which rises an octagonal shaft which very well answers our Vajra type. At Karle³³ (2nd century AD and Nasik)³⁴ are found vase-shaped pedestals above stepped bases, answering very well our *Ghaṭa* and *Vahana* (or *Udvahana*), from which rise square or octagonal shafts ending in capitals consisting of topsyturvied vase surmounted by crowning figures. At Karle again there are two lion-pillars with 16 sided shafts,³⁵ the *Dvivajraka* of our author. Among the specific characteristics of the Gupta buildings is included the shape of the pillars and capitals. Though the capital with longitudinal inverted lotus petals which corresponds to our *Padma* is present at the Buddhist temple at Sanchi assigned to the first half of the fifth century AD,³⁶ the prevailing order of the day was 'the bowl of plenty' (*pūrṇa-kalaśa*) which gave rise to the 'vase and flower' motif which we find at Udayagiri and elsewhere. The Gupta pedestals are mainly square. In spite of this change names like *Ghaṭa*, *Kamala* and *Uttaroṣṭha* were allowed to continue, presumably because they had a history and tradition behind them. That the names of the mouldings of pillars are older than Varāhamihira is evident from their mention in the *Kiraṇākhyatantra*.

The first attempt at the ornamentation of the shaft can be traced to the Besnagar Garuḍa Pillar erected by Heliodorus (cir.140 BC) the lower part of

which is octagonal and the upper 16-sided with a band of 32 facets above. Thus the circular Aśokan shaft was replaced by many-sided ones of which the octagonal seems to have been the most popular. It is this evolved form of the shaft that is referred to by Varāhamihira.

Catuśśālaka

The general plan of a residential house in the Gupta period seems to have been based on a courtyard surrounded by chambers (*śālā*) on one (*ekaśālā*), two (*dviśālā*), three (*triśālā*) and four sides (*catuśśālā*). Five kinds of *catuśśālā* houses are mentioned—(i) *Sarvatobhadra* (31), an edifice with uninterrupted terraces (*alinda*) on all the four sides and broken by four doorways (Fig.34), especially recommended for a royal residence and temples.³⁷ *Sarvatobhadra* is a comprehensive term denoting not only a four-doored structure, but also a quadruple image, one being carved on each side of a four-faced column, and other structures, villages and towns broken by four entrances. Thus two Kuṣāṇa inscriptions from Mathurā record the installation of *sarvatobhadrikā* images.³⁸ In the architectural traditions of south India, however, *Sarvatobhadra* denotes an eight-faced *śālā*³⁹ (ii) *Nandyāvarta* (LII.32) is a structure with verandahs starting from the wall of the hall and going to its extremity from left to right and with a door on each side except in the west⁴⁰ (Fig.35). (iii) *Vardhamāna* (LII.33) has the front terrace of the main building (*dvārālinda*) extending from the left hall to the right hall, thence another terrace from left to right and thereon again another; it has a door on each side except in the south⁴¹ (Fig.36). (iv) *Svastika* (34) has an entrance in the east, and a continual western verandah at the ends whereof begin two other verandahs (southern and northern) going from west to east and between the extremities of the latter is the fourth terrace (eastern)⁴² (Fig.37). (v) *Rucaka* (35) has two terraces touching the ends in the west and east, and touching these two internally two more and one door on each side except in the north⁴³ (Fig. 38). *Nandyāvarta* and *Vardhamāna* are said to be the best for all and *Svastika* and *Rucaka* moderate. *Sarvatobhadra* was suitable for kings and other persons of eminence (36). The *catuśśālā* houses seem to have been very popular in the Gupta age⁴⁴ and they are known as *causallā* in Hindi.

Triśālaka

Of the *triśālakas*, we have references to (i) *Hiraṇyanābha*⁴⁵, a three-halled house

without a northern hall; (ii) *Sukṣetra*, a house without an eastern hall; (iii) *Cullī*,⁴⁶ lacking a southern hall; and (iv) *Pakṣaghna*, without a hall in the west. While *Hiraṇyanābha* and *Sukṣetra* are spoken of with approval, the last two were regarded as inauspicious (37-8).

Dviśālaka

As for the *dviśālakas*, a structure was known as (i) *Siddhārtha*, (ii) *Yamasūrya*, (iii) *Daṇḍa*, (iv) *Vāta*,⁴⁷ (v) *Gṛhacullī* and (vi) *Kāca*, according as it had chambers in the (i) west and south, (ii) west and north, (iii) north and east, (iv) east and south, (v) east and west, and (vi) south and north. Of these only *Siddhārtha* was considered to be auspicious and the rest inauspicious (39-41).

Selection of the Site

Generally speaking, the soil that is soft, even and of sweet odour and taste, is not hollow from inside, and abounds in commendable herbs, trees and creepers⁴⁸ is recommended for building a house (86). The advice that a house should not be constructed close to a minister's or a rogue's residence, a temple, a *caitya* tree and a cremation ground, facing a cross-road, and on a site shaped like a tortoise and abounding in anthills and holes (87-8) is prompted by the desire of providing an hygienic and peaceful environment and ensuring the durability of the structure. Further, the presence of water to the east, south-east, south, south-west, west and north-west of a house is disapproved, while that to the north and north-east is recommended (117). We get three modes of testing the soil:— (i) In the centre of the site was dug out a circular pit, one cubit in diameter and depth; it was filled again with the same earth; according as the pit is insufficiently filled, just filled and overfilled the site in question is the worst, moderate and the best respectively.⁴⁹ (ii) The pit was filled with water which was allowed to remain for the time required for a hundred steps; if the water is not diminished, the site is best suited for erecting a structure.⁵⁰ (iii) If an *āḍhaka*-full of earth dug out of the pit weighs 64 *palas*, the site is fit for construction (90-1). These instructions which aim at avoiding a porous and loose soil for building a house are inspired by practical considerations. The main object of examining the soil appears to have been to ensure the stability of the structure and to ascertain the quantity of water available. Even modern architects approve these principles.

Castes and Site

In ancient Indian town-planning different parts of a settlement were allotted to members of different castes. Thus the houses of the four castes in their descending order were located in the north, east, south and west (67-8). The intermediate directions, which were supposed to be presided over by the demonesses Carakī (north-east), Vidārī (north-west), Pūtanā (south-east) and Rākṣasī (south-west), were relegated to the out-castes such as the *Śvapacas* (81-2). A piece of land possessing certain properties was thought to be specially suited to a particular caste. In this connection, declivity of a site towards a particular direction, colour, odour and taste of the soil, and the variety of the grass growing over it were taken into consideration. Thus a plot declining towards the north, east, south and west, white, red, yellow and black in colour, smelling like clarified butter, blood, food and wine, sweet, astringent, sour and pungent in taste, and covered by *kuśa*, *śara*, *dūrvā* and *kāśa* is recommended for the four castes in a descending order.⁵¹ According to another view, the Brāhmaṇas could have their houses on plots declining in any direction; a Kṣtriya on those declining towards the east, south and west; a Vaiśya on sites sloping in the south or west; and a Śūdra on a site declivous in the west (89, 94-5). In case these signs were not quite clear, some superstitious methods were resorted to. Thus in a pit in the plot was kept an unbaked earthen lamp containing four wicks in the four quarters; the plot is recommended for the caste in whose quarter the wick burns longest.⁵² According to another method, flowers of the colours assigned to the four castes were mixed together and kept for a night in a pit specially dug out for the purpose. The site was regarded as auspicious to the caste the flower of whose colour does not fade away on the next day⁵³ (92-3).

These methods of testing the soil and the practice of relegating it to a particular caste on the basis of its declivity, colour, odour and taste were prevalent from very early times as is evident from their mention in the Gṛhyasūtras.⁵⁴ They are mentioned in almost all the works of both the northern⁵⁵ and southern⁵⁶ architectural traditions, indicating their widespread popularity and universal operation throughout India. After the examination of the soil, the site was ploughed and seeds were sown, evidently to test its fertility.⁵⁷ Then followed purificatory rites consisting of the stay of the Brāhmaṇas and cows there for a night.⁵⁸ Next, the landlord went to the site at an auspicious moment prescribed by an astrologer, worshipped deities and honoured the architect and the Brāhmaṇas. Lastly,

touching his head, breast, thighs and feet according as he was a Brāhmaṇa, Kṣatriya, Vaiśya and Śūdra, he drew a demarcating line which marked the commencement of construction (96-8).⁵⁹

Site-Plan (Pada-Vinyāsa)

Varāhamihira mentions two site-plans consisting of eighty-one (*ekāśītipada*) and sixty-four squares (*catuṣṣaṣṭipada*) which were believed to be presided over by forty-five deities, thirty-two external and thirteen internal (42-50). The plan of sixty-four squares was specially meant for temples and will be discussed in its proper place. As for the plan of eighty-one plots, Brahmā occupies nine squares (*navakoṣṭakādhipa*) in the centre (*Brahma-sthāna*). Of the remaining deities, twenty occupy one square each (*padika*); twenty others known as *dvipada* preside over two compartments each; and four deities occupying three squares each are called *tripada* (Fig.39). This plan was applicable to all kinds of secular structures, towns and villages (67).⁶⁰ These plans were greatly elaborated in later times. The *Samarāṅgaṇa-sūtradhāra* (XIII.1) mentions three kinds of ground-plan, viz., (i) Paramaśayika, of 81 squares, (ii) Caṇḍita, of 64 plots, (iii) Āsana, of 100 squares. The *Mānasāra* (Ch.VII) describes as many as thirty-two plans.⁶¹ But only two comprising 81 and 64 plots appear to have been in use during our period.⁶² This system of dividing the site into squares immensely helped the architect in calculating relative proportions of the various parts of a building. Thus if in the plan of 81 plots construction of the door at Jayanta and Indra is approved (70), it only means that the eastern door in question may be placed in the third or fourth square in the outer band.⁶³ Though our author refers to only square plans, they could as well be applied to circular, hexangular and sixteen-sided structures which are mentioned by him. Utpala is aware of this omission on the part of Varāhamihira and supplies necessary information about circular (Fig.40) and triangular (Fig.41) plans from a work of one Bharatamuni.⁶⁴ Triangular structures, if any, of the Gupta period are not known; they might have been popular in Utpala's time. As we shall see below, the site was believed to be identical with the body of Vāstupuruṣa. A diagonal (*vaṁśa*, 57, 61, 63) is said to be as many digits in breadth as a square measures in terms of cubits and the straight lines running east-west and north-south (*śirā*) were in breadth one and a half times the diagonals (63).⁶⁵ Utpala criticises Varāhamihira for not distinguishing the *vaṁśas* and *rajjus* and extracts two and a half verses from his own work on *Vāstuvidyā* to the effect that the two diagonals from Roga to Vāyu and Pitṛ to Śikhin were called *vaṁśa*,

others being known as *rajju*.⁶⁶ The nine meeting points of the diagonals and the exact middle points of the squares ($1/8$ th of a square) were considered to be the most vulnerable points and these together with *Brahmasthanā*, when hurt by impure articles, nails, pegs, pillars, etc., were believed to trouble the landlord in the corresponding limbs of his body (57-8, 60-64).⁶⁷

Vāstunara

The building-site constituted the body of *Vāstunara*. As for his descent, we are told that once there was some being undefined by name and form; it obstructed the heaven and the earth by its body and was therefore suddenly seized and laid topsyturvy by the host of gods who became the presiding deities of its different limbs touched by them; the Creator made the being House-God (*Vāstunara*) of the nature of gods (2-3). This story is greatly amplified in the *Matsya-purāṇa* (Ch.252). *Vāstunara* is male and his image should be carved in the likeness of man. He should be represented in such a way as to cover the entire site. His head is turned to the north-east and face hung down. Different parts of his body are occupied by several gods in the following manner :

Right Side:—Head-Śikhin; face-Āpaḥ; pap-Aryaman; chest-Āpavatsa, Indra; eye-Parjanya; ear-Jayanta; shoulder-Sūrya; arm-Satya, Bhṛṣa, Antarikṣa, Anila, Pūṣan; hand-Savitā and Sāvitra; side-Vitatha, Brhatkṣata; stomach-Vivasvat; thigh-Yama; knee-Gandharva; shank-Bhṛṅgarāja; buttock-Mṛga.

Left Side:—Pap-Pṛthvīdhara; eye-Diti; chest-Bhujaga; shoulder-Soma; arm-Bhallāṭa, Mukhya, Ahi, Roga, Pāpayakṣmā; hand-Rudra, Rājayakṣmā; side-Śoṣa, Asura; thigh-Varuṇa; knee-Kusumadanta; shank-Sugrīva; buttock-Dauvārika; genital organ-Śakra, Jayanta; heart-Brahmā; feet-Pitṛ (51-4).

As regards other arrangements of a house, it is laid down that in a *catuśśāla* house, the chamber of worship (*devagrha*) should be located in the north-east, kitchen in the south-east, store-room in the south-west, and granary and treasury in the north-west (116). A bed-chamber along the diagonals was disapproved (122). It is further laid down that a house should be so constructed that when one enters the courtyard, it should lie to one's right. According to Utpala, it means that according as a house faces the east, south, west and north, the entrance of the courtyard should face north, east, south and west respectively (68 comm.). As a general rule it is enjoined that a house should be equally elevated on all sides. In case it is not possible to avoid an unsymmetrical elevation, it may be

either in the east or north (113-115). Buildings were also required to be straight and face a cardinal point, and those violating this rule were believed to anticipate certain disasters (113).

Stone-laying Ceremony

The next operation following the selection of the site and the preparation of the ground-plan was to lay blocks of stones first in the south-east and then in the south, south-west, west, north-west, north, north-east and east in order, or according to another interpretation beginning with the north-east in a clock-wise manner (*pradakṣiṇa*), which marked the commencement of building and resembled the modern stone-laying ceremony. Columns and doors were also erected in a similar manner. Utpala informs us that the latter interpretation was followed by architects in his time (110-11).⁶⁸

Vajralepa, Vajaratala, Vajrasaṅghāta

Besides mentioning burnt bricks (*pakveṣṭakā*, 23), wood⁶⁹ (23) and stone (110-111) as building materials, Varāhamihira in Ch.56 of the *Bṛhatsamhitā* describes four kinds of plaster—two Vajralepas, Vajaratala, and Vajrasaṅghāta. Vajralepa was composed of the precipitate of unripe *tinduka* and *kapitthaka* fruits, blossoms of the silk-cotton tree, seeds of *śallakī*, skin of *dhanvana* and *vacā* boiled in a *drona* of water and reduced to 1/8th of its original volume and finally mixed with *śrīvāsaka* (resin of a tree), *rasa*, *guggulu*, *bhallātaka*, *kunduruka* (resin of *devadāru*), resin of *sarja*, linseed and *bilva* fruit (LVI.1-3). Another plaster of the same name was prepared in the above manner from lac, resin of *devadāru*, *guggulu*, *grhadhūma*,⁷⁰ kernel of the *kapittha* and *bilva* fruits, fruits of *nāga*, *nimba*, *tinduka* and *madana*, resin of *sarja* and myrobalan fruit (LVI.5-6). A paste called Vajaratala was prepared in the above manner from the horns of cows, buffaloes and goats, hair of donkeys, skins of buffaloes and cows, *nimba* and *kapittha* fruits and *rasa* (LVI.7). A plaster composed of eight parts of lead, two of bell-metal, and one of iron-rust was known as Vajrasaṅghāta.⁷¹ These pastes were applied hot to temples, mansions, windows, *liṅgas*, images, walls and wells and are said to adhere for 'a crore of years' (LVI.4).

It was held by M.M. Ganguli⁷² that the red paint seen on some temples at Bhuvaneshwar and a few sculptures in the Koṇārka temple is really the Vajralepa

mentioned by our author. But a chemical analysis of a sample of the red paint from the Mukteshwara temple at Bhuvaneshwar renders the conjecture improbable.⁷³

Ceremonials and Beliefs

Religion has played a vital role in all walks of Hindu life and architecture is not an exception. A number of rituals was performed in course of construction. Oblations were offered to Vāstunara and deities of squares and omens interpreted from the appearance of fire.⁷⁴ The site-plan is inspired to a great extent by religious considerations. Worship was offered to deities while demarcating a building-site (97). Every constituent of a structure was looked upon with a feeling of sanctity and columns and doors were erected being decked with parasols, wreaths, cloths, incenses and ornaments (111). Before cutting down a tree for timber, offerings were made to it in the previous night and only a tree that fell to the north or east was to be used (121). After a building was ready, the entrance ceremony was performed as now with great pomp and show. The house was decorated with an abundance of flowers, leafed arches and pitchers filled with water. The Brāhmaṇas recited Vedic hymns and gods were worshipped with incenses, perfumes and oblations (123).⁷⁵

Besides, there were certain beliefs which may be recorded here. When the landlord entered a finished or unfinished house, the place where he stood and the particular limb he touched were carefully observed and these in association with the birds and animals crying harshly or warbling sweet were supposed to indicate the presence of a bone or wealth inside the earth (103-105, 107). The braying of an ass at the time of measuring the site and a dog or jackal crossing the measuring string were also taken to indicate the presence of a bone (106). Similarly, the snapping of the measuring string, a peg driven upside down, the architect and the landlord forgetting something, the falling from shoulder, draining away or breaking of a water-jar, birds sticking to columns and doors, and the shaking, fall or misplacement of pillars or doors were believed to foreshadow certain calamities (108-109, 112).

Sthapati

We may conclude this section with a few words about the architect. In later works various classes of architects are mentioned. The *Samarāṅgaṇa-sūtradhāra*

(Ch.44) refers to four classes of architects, viz., *Sthapati*, *Sūtragrahin*, *Vardhakin* and *Takṣaka*, and describes their qualifications with meticulous details, while the *Mānasāra* (Ch.2) narrates their legendary origin. These categories are conspicuous by their absence in our work as also in the *Matsya-purāṇa*, which refer to the architect by the common name *sthapati*. *Sthapati* combined in him the functions of both the engineer and the mason. He was responsible for preparing the ground-plan and for the successful completion of the undertaking. As a result of the high qualifications and the useful service he rendered to the society, he enjoyed a high status. In the various stages of construction, the landlord showed respect to him and at the commencement of building, honour was accorded to the *sthapati* even before the Brāhmanas.

II

TEMPLE ARCHITECTURE

Temple-architecture is dealt with in Ch. LV entitled 'Prāsādalakṣaṇādhyāya'. It will be worthwhile to analyse the contents of this chapter with special reference to the actual specimens that have come down to us.

Prāsāda

Prāsāda is the most common word used to denote a temple.⁷⁶ It occurs in this sense in the *Amarakoṣa* (II.2.9), *Matsya-purāṇa* (Chs.CCLXIX-CCLXX), the Eran inscr. of the time of Toramāṇa, Mandasor inscr. of Kumāra Gupta and Bandhuvarman, Gwalior inscr. of Mihirakula, Bodh-Gaya inscr. of Mahānāman⁷⁷ and a large number of other literary and epigraphic records. *Surālaya*⁷⁸, *surabhavana*,⁷⁹ *devālaya*,⁸⁰ *devatāyatana*,⁸¹ *devakula*,⁸² *devagrha*,⁸³ *devāgāra*,⁸⁴ *āytana*⁸⁵ and *vibudhabhavana*⁸⁶ are other words used in the same sense. It is curious to note that the word *mandira* which is so very popular now-a-days does occur⁸⁷; but as observed by Utpala, it denoted a residential building and not a temple.

The construction of temples was considered to enhance one's reputation and religious merit and to lead the builder to the worlds attainable by the observance of *iṣṭa* (sacrifices) and *pūrta* (charitable acts, LV.1-2; LXVII.49). Shrines are known to have existed much earlier;⁸⁸ but being built of impermanent and perishable materials,⁸⁹ they could not survive the millennia that have since elapsed. The use of brick and stone for religious structures gave a new power

in the hands of the architect. The idea of the religious merit accruing from the construction of temples provided another incentive. Though very few temples of the Gupta period are now extant, contemporary epigraphic and literary evidence leaves no room for doubt that the country was literally covered with shrines belonging to various sects.

The Site

Detailed instructions are given regarding the selection of the site a temple is to stand upon. Generally speaking, the site should have plenty of water, trees and groves. Thus the spots best suited to receive temples were those skirted by forests, rivers, mountains and cataracts. But in the densely populated cities and towns where natural scenery in the form of rivers and forests was conspicuous by its absence the selected site had to be beautified by excavating tanks and laying out gardens and parks, for the presence of gods was considered to be easy of access in those places alone which are furnished with water and gardens, natural or artificial. 'Deities', says Varāhamihira, 'come near the spots furnished with water and groves, natural or artificial. They always sport in places rendered charming on account of ponds which have a parasol of lotuses warding off the beams of the sun, clear water with the avenues of white lotuses agitated by swans with their shoulders, resound with the notes of swans, *kāraṇḍava*, *krauñca* and *cakravāka* and have the aquatic animals in the shade of *nicula* trees standing on their banks; or near the rivers having *krauñca* birds for their elaborate girdles, melodious notes of *rājahamsas* for their voice, beautiful garments in the shape of a vast sheet of water, belts in the form of fishes, floral ear-ornaments in the form of blooming trees on their banks, buttocks formed by confluences, lofty spots on the banks forming their breasts, and *hamsas* for laughter. The gods are delighted to dwell in places skirted by forests, rivers, mountains and cataracts as also in towns furnished with parks.' (LV.3-8). Utpala quotes some verses of similar import from Kāśyapa. That these injunctions were followed in practice is evident from the fact that almost all ancient temples are found to have ponds, lakes or rivers nearby. Skirted by hills on the south, west and north, the Daśavatāra temple at Deogadh lay in close proximity of the river Betwa; the temples at Bhuvaneśvara, Purī and Koṇārka had tanks close by; and the cave temples at Ellora and the rock-hewn monasteries and *caitya*-halls at Ajanta, Karle and Kanheri were all located in a beautiful natural setting.⁹⁰

Site Plan

The temple-site was usually divided into sixty-four plots by drawing nine lines across and nine vertically as also diagonals from corner to corner (Fig. 42). In this scheme, Brahmā occupies four central plots which are consequently known as *Brahma-sthāna*. The four squares in the corners along the circumference of Brahmā and the four outermost corner squares are shared by two deities each, while the gods located on both sides of the outermost corners are allotted one and a half squares each. The remaining twenty gods preside over two squares each and are, therefore, called *dvipada*.⁹¹ Like the plan of eighty-one squares, it could also be applied to circular structures (Fig.43).

These presiding deities constituting Vāstupuruṣa were worshipped throughout the different stages of construction with various offerings which are amplified in the *Matsya-purāṇa* Ch. CCLXVIII. That this division of the site selected to receive a structure was no innovation of astrologers and was actually followed by architects is clear from the surviving examples of contemporary temple architecture. It is accepted by archaeologists that Hindu temples were usually laid on the plan of squares. Thus Cunningham⁹² and, following him, M.S. Vats⁹³ have pointed out that the terrace over the basement of the Gupta temple at Deogadh was divided into nine equal squares, the central one being occupied by the *garbhagrha*. It is, however, interesting to note that this plan is in agreement not with the scheme of 64 squares detailed above but with that of 81 squares (*ekāṣṭi-pada*) in which Brahmā occupies nine central squares.⁹⁴

Measurements

The one purely architectural module of proportionate measurement elaborated by Varāhamihira is the width of the *prāsāda* measured externally. In some respects the proportionate dimensions of the various parts of a shrine differ radically from those prescribed for a residential building. Thus while a residential house is required to be equal in height and width, the height of a temple should be double its width and the terrace (*kaṭi*) above the basement over which the shrine is to be erected should be one-third of this height.⁹⁵ This accords fairly well with the *Viṣṇudharmottara* (III. LXXXVI.4) according to which the *jagatī* (base) is to be 1/3rd of the height. The internal breadth of the *garbhagrha* is half of its external width, the remaining portion being occupied by thick walls.⁹⁶ These rules appear to have been followed in some of the extant temples. Thus the relative proportions

between the width and the height are approximately applicable to the Daśāvatāra temple at Deogadh which is a plain square 18' 6" x 18' 6" side⁹⁷ and 'its height when entire could not have been less than 40 feet'.⁹⁸ As pointed out by Cunningham,⁹⁹ the height of the temple at the foot of the Godoni hill at Pathari, 50 miles to the north-north-east of Vidiśa, is exactly twice its width, which is strictly in accordance with the dimensions given by our author. As to the proportion between the external and internal width, the Deogadh temple externally measures 18' 6" x 18' 6", while the square sanctum it leads to is 9' 9", deviating very slightly from the dimensions mentioned above. But the exact corroboration of the proportions under consideration is to be met with in the Muṇḍeśvarī temple which externally measures 40' in diameter, while the internal diameter of the *garbhagrha* is exactly 20 feet, the walls being 10 feet thick.¹⁰⁰ Similarly a later temple at Paraoli in Kanpur is 13' 4" in external diameter, the cella measuring internally 6' 8".¹⁰¹

Next are given rules about the dimensions of the doorway. In width it is 1/4th of the *garbhagrha*, thus covering only 1/8th of an entire side-wall. In contradistinction to the doors of the residential buildings (of the members of four castes) which should be in height three times their width, the height of the temple-door is only twice the width, the difference being apparently inspired by the practical consideration that a door with a height only two times its width would be too low for residential purposes. The jamb (*śākhā*) and the lintel and sill (*udumbara*) should each be in width equal to a quarter of the height, the depth of the former (*śākhā*) being a quarter of the width of the door, i.e., half its own width (LV.12-13).

Some of the extant examples show that these dimensions were more or less followed in constructing temples. Thus the height of the doorways of the caves 1, 4 and 5 at Ajanta is about twice the width. The doorway leading to the sanctum of the Gupta temple at Deogadh measures 6' 11" x 3' 4"¹⁰² which approximates to the dimensions laid down in our text.

About the general position of the door it is laid down that it should face an exact cardinal point and not an intermediate direction and should be so placed in the middle of the side wall that equal parts of a wall are left on both the sides (LV.10). It is interesting to note in this connection that from his survey of the Gupta temples Cunningham concluded that 'deviation in plan from the cardinal point' was one of the characteristics of the Gupta style and suggested

that 'it may have been an intentional deviation of one Nakṣatra or lunar mansion amounting to 13°12'.¹⁰³

Another set of proportionate measurements which is not elaborated but implied is the height of the main cult-object, whether *linga* or image, housed in the shrine. It is, thus, stated that the total height of the image-cum-pedestal should be less by 1/8th than that of the doorway, the ratio between the height of the image and the pedestal being 2/3 and 1/3 respectively.¹⁰⁴ It would follow from the above that Varāhamihira is very very clear on the relation between the different parts of the edifice and that between the edifice and the height of the main cult object.

It is interesting to note that the canons laid down by Maya and Viśvakarman about the height of a *bhūmi* (storey) are reiterated by Varāhamihira. According to Maya, a storey's altitude is 108 *aṅgulas* (6'9"), whereas Viśvakarman pronounced it to be three cubits and a half or 84 *aṅgulas* (5'3"). But as pointed out by Varāhamihira, in reality no difference exists between the two, for if we add the height of the crown work called *kapotapāli* the smaller figure would equal the larger.¹⁰⁵

Decorative Features

The usual plainness of the early Gupta temple was relieved by its delicately ornamented doorway. We get reference to the following decorative features: the door-jamb comprising 3, 5, 7 or 9 vertical mouldings, the lower one-fourth portion of the door-jamb occupied by an attendant figure (*pratihāra*) on each side, auspicious birds such as *haṁsa*, *jīvaka*, *kāraṇḍava* and *cakravāka*, *śrīvṛkṣa*, *svastika*, auspicious pitchers, amorous couples, foliated scrolls, and the dwarfish figures called *Pramathas*.¹⁰⁶

To give only a few example, the door-jambs of the Śiva temple at Bhumara and the Viṣṇu temple at Eran each consist of three distinct vertical bands of carving.^{106a} Similar is the case with the Bina cave (No.3) at Udayagiri where 'the plain frame is surrounded by three lines of rich mouldings,'¹⁰⁷ and the doorway on the south end of the verandah of the Chandra Gupta cave 'is divided into sculptured panels, two to left and three to right.'¹⁰⁸ The door-frames of the Deogadh¹⁰⁹ and the Śiva temple at Dah Parbatia in Assam,¹¹⁰ however, comprise four vertical mouldings of carving on each side which does not agree with the

prescribed rule. The door-keepers are to be seen at Deogadh, Udayagiri,¹¹¹ Nachna,¹¹² etc. All these motifs except the auspicious birds may be recognised in the Gupta temple at Deogadh and the lucky birds at Dah Parbatiya. The presence of the river goddesses Gaṅgā and Yamunā on *makara* and tortoise respectively usually on the proper right and left sides of the door-jamb alongside the lintel and sometimes below, which is regarded as one of the characteristics of the Gupta style,¹¹³ is conspicuous by its absence not only in our text but also in other early texts. In early temples they stand usually higher up alongside the lintel, e.g., at Deogadh, Nachna, Kuthara, Tigava; but occasionally they have their position below as at Bhumara, Eran and Dah Parbatiya temples. Another decorative feature which remains unnoticed in our work is the miniature figure of the cult deity enshrined in the cella in the centre of the lintel (*dvāra-lalāṭa-bimba*) as at Deogadh,¹¹⁴ Bhumara,¹¹⁵ Dah Parbatiya¹¹⁶ and other places.

Temple-Types

Varāhamihira mentions the following twenty types of temples differing from one another in regard to dimensions, arrangements and plan:—1. Meru, 2. Mandara, 3. Kailāsa, 4. Vimānacchanda, 5. Nandana, 6. Samudga, 7. Padma, 8. Garuḍa, 9. Nandivardhana, 10. Kuñjara, 11. Guharāja, 12. Vṛṣa, 13. Haṁsa, 14. Sarvatobhadra, 15. Ghaṭa, 16. Simha, 17. Vṛtta, 18. Catuṣkoṇa, 19. Soḍaśāśri and 20. Aṣṭāśri (LV.17-9). This classification is based on the number of storeys and spires, divergent dimensions and plan and the position of doors variously designed with a view to provide a desired volume of light or darkness. Roughly speaking, they conform to 16-angled, octagonal, hexagonal, dodecagonal, square and round plans. The first three names denoting the largest temples then known are evidently derived from mountains on account of their imposing height. Differences between these types are so great that Stella Kramrisch¹¹⁷ has been constrained to suggest that 'they were due partly to the integration of sanctuaries of heterogeneous origins in Hindu temple.'

1. *Meru*, the largest temple described in our text, is hexagonal in shape, has twelve storeys, variegated windows and four entrances facing cardinal points, and is 32 cubits (48") wide.¹¹⁸ As observed by Bühler,¹¹⁹ Meru is originally the name of the fabulous golden mountain in the centre of Jambudvīpa on which gods reside and it is only figuratively that it denotes a temple-type and is applied in geographic names to any hill covered with splendid temples and palaces, e.g., Jaisalmer,

Komalmer, Ajmer. A detailed account of Meru is found in Bhoja's *Samarāṅgaṇa-sūtradhāra* (LV.5) according to which its width ranges from 33 to 50 cubits; it is the lord of the *prāsādas* and is built by a Kṣatriya alone, its *sthapati* or architect being a Vaiśya or a Brāhmaṇa (*Ib.* LV.36,39). Some references to Meru are to be found in mediaeval inscriptions. The Kalacuri ruler Yaśaḥkarṇa is said to have built at Kāśī the temple Karṇameru proclaiming his great fame, resembling 'the circle of waves of the milk-ocean' and being so lofty as to lessen 'the fatigue of the multitudes of the celestial damsels playing in the sky, with the breezes of the flags waving from its golden spires.'¹²⁰ Gāṅgeyadeva is stated to have 'made this earth... though situated below, soar higher than heaven which is an abode of gods, by constructing a matchless Meru.'¹²¹ The Gunganva inscription of Meruvarman, king of Chamba, refers to a temple built by him on the top of the Himavanta mountain resembling the Meru and endowed with the *candrasālās*, *prāggṛīvakas* and various *maṇḍapas* adorned with numerous paintings.¹²² A temple called Karṇameru Prāsāda at Anhilwad built by the Caulukya king Karṇa of Gujarat is mentioned by Merutuṅga in his *Prabandha-cintāmaṇi*. The *Prabhāvaka-carita* also refers to a Śiva temple called Siddhameru.¹²³

2. *Mandara* is a six-faced temple 30 cubits (45 feet) in width, having 10 storeys and cupolals (*Trīmśaddhast-āyāmo daśabhaumo Mandaraḥ śikhara-yuktaḥ*, LV.21).

3. *Kailāsa* is the name given to a temple hexagonal in shape, twenty-eight cubits (42 feet) wide and having eight storeys and turrets (*Kailāso=ṣi śikharavān=aṣṭāvīmśo=ṣṭabhaumaś=ca*).¹²⁴

4. *Vimāna*, besides being one of the most common words denoting a temple, signifies a special class of six-sided temples, 21 cubits in width and provided with latticed windows (*Jālā-gavākṣaka-yuktaḥ Vimānasaṁjñas=tri-saptak-āyāmaḥ*, LV.22). Varāhamihira is silent about the number of storeys, but Kāśyapa gives it as eight.¹²⁵

5. *Nandana*, like Meru, is six-sided and 32 cubits wide and has six storeys and sixteen cupolas (*Nandana iti ṣaḍ-bhaumo dvātrīmśaḥ ṣoḍaś-āṇḍa-yuktaḥ*). This is the last in the series of six-sided temples.

6. *Samudga*, as indicated by the name, is circular in shape and resembles green gram and, like the next type, is provided with a single storey and spire (*śṛṅga*) and is only eight cubits wide. *Śṛṅga* is the same as *śikhara* but has no storeyed superstructure.

7. *Padma* is a suggestive name connoting a temple shaped like eight lotus petals. In all other details it resembles *Samudga* (*ṛttaḥ Samudganāmā Padmaḥ padm-ākṛtiḥ śayā aṣṭau, Śṛṅgeṇ-aikena bhaved=ek-aiva ca bhūmikā tasya*, LV.23. Cf. Utpala: *Padmaḥ padm-ākṛtiḥ kamal-ākāraḥ aṣṭabhir=dalair=yuktaḥ*).

8. *Garuḍa* is a meaningful name which denotes a structure resembling a *garuḍa* bird, i.e., provided with architectural members very similar in appearance to the wings and tail of this bird. It is twenty-four cubits in width, has seven storeys and twenty *aṇḍas* or *āmalakas* (LV.24). According to the *Viṣṇudharmottara*, it is a rectangular building.¹²⁶

9. *Nandivardhana* is shaped like *Garuḍa*, but is devoid of wings and tail. Like *Garuḍa*, it is twenty-four cubits wide and has seven storeys and twenty *aṇḍas*.¹²⁷

10. *Kuñjara* is shaped like an elephant's back, 16 cubits all round at the bottom, and has only one storey and a roof with three *candraśālās*.¹²⁸ It refers to the apsidal plan and barrel-vaulted structure which is very rare in the galaxy of Hindu devotional buildings. However, it is illustrated by the Durga temple at Aihole and the brick temples of Kapoteśvara at Chezerla¹²⁹ and of Trivikrama at Ter which were adjusted for the purpose of Brāhmaṇical worship by introducing certain devices. A beautiful illustration of the Gaja-prṣṭha or elephant back-shaped structure is to be seen in the *rathas* of Nakula and Sahadeva at Māmallapuram.¹³⁰

11. *Guharāja*, as indicated by the name and pointed out by the commentator, is shaped like a cave (*Guharājo guh-ākāraḥ*). It measures 16 cubits and its roof is provided with three *candraśālās*.¹³¹

12. *Vṛṣa* is circular all round and twelve cubits wide and has only one storey and one turret (*Vṛṣa ekabhūmi-śṛṅgo dvādaśa-hastaḥ samantato ṛttaḥ*, LV.26)

13. *Haṁsa* is shaped like a swan, i.e., with beak, wings and tail (*Haṁso haṁs-ākāraḥ*, *ib.* Cf. Utpala:—*haṁsa-sadṛśaḥ cañcu-pakṣa-puccha-yuktaḥ*). It has one storey and one turret, its breadth being 16 cubits.

14. *Ghaṭa* is shaped like a pitcher, is 8 cubits wide, and has one storey and one turret (*Ghaṭo-ṣṭa-hastaḥ kalaśa-rūpaḥ*, *ib.*).

15. *Sarvatobhadra* is 26 cubits wide and has four entrances (one in each quarter), many spires, *candraśālās* and five storeys.¹³² Utpala tells us that it is square (*caturasra*) in plan. It is clearly stated in a verse of Kāśyapa quoted by

him.¹³³ Very few Brāhmaṇical temples are provided with entrances in the four quarters,¹³⁴ whereas Jaina shrines as a rule have openings on all the four sides. In the Karkala inscr. of Bhairava II, a Tribhuvana Jina Caityālaya having four faces is styled *Sarvatobhadra*.¹³⁵ It has been suggested by K.N. Dikshit that a four-faced (*caturmukha*) Jaina temple on the spot or in the immediate vicinity might have furnished the barest outline of the main temple at Paharpur in Bengal.¹³⁶ S.K. Saraswati thinks that this imposing structure, measuring 356'6" from north to south and 314'3" from east to west, agrees in general with the *Sarvatobhadra* of Varāhamihira.¹³⁷ But the temple, as it is, does not agree either with the description given in our text or with that in the *Matsya-purāṇa*, according to which it should have five storeys, 16 corners with various shapes and art-galleries (*citraśālā*) and should be 30 cubits in width.¹³⁸

16. *Siṃha*, single-storeyed, 8 cubits in width and dodecagonal in plan, is decorated with the figures of lions.¹³⁹

17-20. As indicated by their names, *Vṛita* is circular; *Catuṣkoṇa*, square; *Soḍaśāśrī*, 16 sided; and *Aṣṭāśrī*, octagonal. They are all single-storeyed and, with the exception of *Caturasra* (which has 5 crowning *aṇḍas*, one in the middle and one each on four corners), are provided with one *aṇḍa* each. They are dark in the interior.¹⁴⁰ We are told by the commentator that walls should be built all round so as to leave a dark passage between them and the *garbhagṛha* and that the door should be placed on the west so that when one enters the *prāsāda*, it should be to one's left. The image should be of jewels so that it may illumine the *garbhagṛha*. The outer walls should be so cut as to look as originating from the main building (*prāsāda*) and not detached from it, i.e., outer walls end at a lower level than those of the *prāsāda* and are connected with it by means of a roof.¹⁴¹ The Śiva temple at Bhumara illustrates the *Catuṣkoṇa* shrines of this type; the Lad Khan, Konti-Gudi and Meguti temples at Aihole and the temple at Nachna which could also serve as examples, however, have a storeyed superstructure. The Muṇḍesvarī temple on the summit of a hill, about 600 feet high, close to Ramgarh in Orissa, is a fine example of an octagonal temple both inside and outside, but without an ambulatory passage.¹⁴² *Soḍaśāśrī* or 16 faced temples are extremely rare.¹⁴³

It would appear from what has been said so far that many of the temple-types described above cannot be properly illustrated from the extant remains. Many structures illustrating these types must have perished. As these types are

also mentioned in some other works, e.g., *Matsya-purāṇa*, *Viśvakarma-prakāśa*, *Bhaviṣya-purāṇa*, it seems very likely that Varāhamihira based his account on the monuments existing in his time.

III

SCULPTURE, MUSIC, PAINTING

I. SCULPTURE

Like architecture, sculpture had reached a highly advanced state by the time of our author. The popularity of the practice of image-worship provided a great stimulus to the image-making activities of the sculptor. Varāhamihira furnishes us with valuable information regarding sculptural material and iconometric proportions.

Materials

Special reference must be made in this connection to the *Vanasampraveśādhya* (Ch.LVIII), which contains details about procuring timber for fashioning various images. First, at an auspicious moment the sculptor went to the forest. Forbidden was the timber of the trees that grow on a cremation ground, by the road-side, near a temple, on anthills, in parks and penance groves, of *caitya-vṛkṣas*, of those growing at the confluences of rivers, and nurtured with great care (literally irrigated by jars full of water), bent ones, growing very close to other trees, overgrown with creepers, of those that are damaged by lightning, storm or an elephant, of those that have fallen by themselves or are dried and burnt by fire, and of those that contain bee-hives (LVIII.1-4). Next we are told what trees were to be used in fashioning images or a *liṅga* by the members of the different castes. Thus *devadāru*, sandalwood, *śamī* and *madhūka* are recommended for the images made by a Brāhmaṇa; *aṛiṣṭa*, *aśvattha*, *khadira* and *bilva* for those installed by a Kṣatriya; *jīvaka*, *khadira*, *sindhuka* and *syandana* for those set up by a Vaiśya; and *tinduka*, *kesara*, *sarja*, *arjuna*, *āmra* and *śala* for those established by a Śūdra.¹⁴⁴ Before a tree thus selected was cut down, certain rites were to be performed. The sculptor marked off the various sections, top and bottom of the trunk so that the sections, top and bottom of an image or *liṅga* might correspond to those of the tree.¹⁴⁵ A verse of Kāśyapa as quoted by Utpala contains the same

direction.¹⁴⁶ That this direction was followed in practice would appear from its mention in the *Viṣṇudharmottara* (Bk. III, Ch.89) and other works. Next at night the sculptor propitiated the tree, gods, manes, Piśācas, Rākṣasas, Nāgas, Asuras, Gaṇas, Vināyakas and others (Utpala adds Bhūtas, Pretas, Siddhas, Vidyādharas and Gandharvas), and touching the tree recited a *mantra* asking the spirits haunting the tree to leave it and change their habitation (LVIII.8-11). Next morning he sprinkled the tree with water and cut it with an axe greased with honey and clarified butter beginning on the north-eastern side and keeping it to his right (LVIII.12.)¹⁴⁷

Classification

Varāhamihira divides images and *liṅgas* into seven categories on the basis of the materials from which they were fashioned:—1. *dārumayī* (wooden), 2. *mṛṇmayī* (clay), 3. *maṇimayī* (from precious stones), 4. *sauvarṇī* (golden), 5. *rajatamayī* (silver), 6. *tāmramayī* (copper), and 7. *śailī* (stone).¹⁴⁸ With slight modifications this classification is found in the *Matsya-purāṇa*, *Śukra-nītisāra* (IV.4.72) and *Samarāṅgaṇa-sūtradhāra* also.¹⁴⁹ It is noteworthy that in the above list wooden images come first and it is this material to which one full chapter is devoted. The procedure of selecting wood for images is described in the *Matsya-purāṇa* (Ch.257), *Viṣṇudharmottara* (Bk.III, Ch.LXXXIX) and *Bhaviṣya-purāṇa* (Brahmaparvan, Ch.131) also. This indicates that at an early period perishable materials like wood and clay were principally employed in fabricating images which could not survive the long passage of time, particularly in the tropical weather of India. As suggested by J.N. Banerjea,¹⁵⁰ like early architectural remains, extant early stone sculptures in the round and relief-carvings may have been influenced by their wooden prototypes with regard to the form and technique.

It is interesting to note that from very early times different materials were considered to be especially appropriate for the images of certain divinities. Thus copper,¹⁵¹ crystal,¹⁵² sandalwood,¹⁵³ shell or iron,¹⁵⁴ gold,¹⁵⁵ silver,¹⁵⁶ iron,¹⁵⁷ nāga (?),¹⁵⁸ and bronze¹⁵⁹ are prescribed for the images of the Sun, Moon, Mars, Mercury, Jupiter, Venus, Saturn, Rāhu and Ketu respectively.¹⁶⁰ Similarly, wood or gold, iron, silver, white clay, gold and cow's skin were regarded as particularly suited to the figures of Indra, Yama, Varuṇa, Vāyu, Kubera and Śiva respectively.¹⁶¹

Iconometry

Ancient Indian writers on sculpture insisted on a strict adherence to the prescribed proportions in representing a deity, whether anthropomorphically or symbolically. Our author devotes a major portion of the *Pratimālakṣaṇadhyaḥya* (Ch.57) to this topic. Before we give a table of proportions and quote and annotate the original, it is necessary to make some preliminary remarks.

The unit of measurement adopted by Varāhamihira in giving various proportions is *aṅgula*. Besides the absolute *aṅgula* based on the thickness of certain natural objects noticed above,¹⁶² *aṅgula* as a relative unit was also known and used mainly in measuring images. The latter was obtained by dividing the entire height of a given image into 120, 108, etc., equal parts, each being called an *aṅgula*. This is the same as the *dehalabdhāṅgula* or *dehāṅgula* described in the later Āgamaic works.¹⁶³ Referring to an image measuring 108 *aṅgulas* in height, Varāhamihira lays down that the length and width of the face of an image should be 12 *aṅgulas* of its own (*Svair=aṅgula-pramāṇair=dvādaśa vistīrṇam=āyatam ca mukham*, LVII.4) Commenting on this line, Utpala says that the whole height of the block of timber or stone from which an image is to be fashioned, leaving aside the portion of pedestal, should be divided into twelve equal parts, each of which should again be subdivided into nine equal parts known as *aṅgulas*; thus an image consists of 108 *aṅgulas* of its own.¹⁶⁴ It is significant that another relative *aṅgula* called *mātrāṅgula*, which is taken to be equal to the length of the middle digit of the middle finger either of the sculptor, or of the architect, or of the rich devotee who causes an image to be set up,¹⁶⁵ is unknown to Varāhamihira.

The exception made by him in the case of Rāma, the son of Daśaratha, and Bali, the son of Virocana, the height of whose images is fixed at 120 *aṅgulas*, shows that the images measuring 108 *aṅgulas* of their own height were most common in the Gupta period. He classifies images (other than those 120 *aṅgulas* in height) as the best (*pravara*), medium (*sama*) and inferior (*nyūna*), each being twelve *aṅgulas* less in height than the preceding one. Thus images measuring 108, 96 and 84 *aṅgulas* are grouped as the highest, middlemost and lowest respectively.¹⁶⁶ They correspond to *navatāla*, *aṣṭatāla* and *saptatāla* images respectively described in such late texts as the *Vaikhānasāgama*, *Karaṇāgama* and others. But curiously enough, the word *tāla* is mentioned neither by Varāhamihira nor by Utpala, who measure the entire height in terms of the unit *aṅgula*. This

shows that *aṅgulas* was the prevailing unit of measure and although a larger unit consisting of 12 *aṅgulas* was known, it was not called *tāla* and that *tāla* as the name of a larger unit was unknown. It further shows that the *tāla* measure along with the images of fluctuating heights, e.g., *Uttama-daśa-tāla* (124 *aṅgulas*), *Madhyama-daśa-tāla* (120 *aṅgulas*), *Adhama-daśa-tāla* (116 *aṅgulas*) was a late introduction in the iconometric art of India.¹⁶⁷

As gods were usually conceived in human form, it is quite natural that their images should correspond to the height of men. We are not disappointed in our inquiry: The heights ascribed to the first two varieties of images (best and medium measuring 108 and 96 *aṅgulas*) are actually borrowed from the same of the Mālavya and Hama, ¹⁶⁸ two of the five great men in whose existence Indians believed from very ancient times.

A higher unit of measure employed in measuring the height of an image was *hasta*. Thus our author states that an image 1 *hasta* high is auspicious; that 2 *hastas* in height bestows wealth; and those 3 or 4 *hastas* high tend to ensure welfare and affluence.¹⁶⁹ These dimensions appear to have been meant only for the images installed in temples, those enshrined in a household chapel being much smaller.¹⁷⁰

The height of an image intended to be installed in a temple depended on that of the shrine-door. According to Varāhamihira, the height of the shrine-door less by 1/8th should be divided into three parts, one part giving the height of the pedestal (*piṇḍikā*) and the remaining two, that of the image.¹⁷¹

In the art tradition of India, the same ornaments and dress were shown on divine images as on human figures. Varāhamihira simply voices this fact when he says that an image should be provided with the equipment, apparel, ornaments and form corresponding to the same of the country (to which the image belongs) and that an image possessing required characteristics bestows opulence by its very presence.¹⁷² Much stress was laid on giving the image a beautiful appearance. Thus an image endowed with excessive or undersized limbs, thin belly and lean body, an abrasion, and the eyes turned upward or downward was believed to have disastrous effects. That the frontal pose of representing a deity was considered to be the best would appear from the statement that an image leaning to the left or right destroys its maker's wife or life.¹⁷³

A table of measurements based on verses 4-28 of BS Ch.57 is given below:—

The limb measured	Measurements in its own <i>aṅgulas</i>
The breadth and length of the face	12
	But according to the Drāviḍa measurement given by Nagnajit, the length should be 14 <i>aṅgulas</i> . ¹⁷⁴
The length of the nose, forehead (vertical), chin (<i>cibuka</i>) and neck, each	4
The breadth of the two jaws (<i>hanu</i>) ¹⁷⁵ and the chin (<i>cibuka</i>) ¹⁷⁶	2
The breadth of the forehead (horizontally)	8
The temples to be shown 2 <i>aṅgulas</i> further off from the forehead, their downward length being	4
The breadth of the ears ¹⁷⁷	2
The upper margin of the ear should be done on the same level with the eye-brow, the distance between the extreme corner of the eye and the top end of the ears being ¹⁷⁸	4½
	But according to Vasiṣṭha, the distance between the outside end of the eye and the ear should be 4 <i>aṅgulas</i> . ¹⁷⁹
The ear-hole and the raised tip of the flesh near it called <i>sukumāraka</i> should be made in the same line with the rheum of the eye, their extent being each ¹⁸⁰	1
The width of the lower lip	1
The width of the upper lip	1
The width of the dimple above the upper lip	½

The limb measured	Measurements in its own <i>aṅgulas</i>
The length of the mouth	.... 4
The width of the mouth when closed	.... 1½
The width of the mouth when opened ¹⁸²	.... 3
The extent of the nostrils	.... 2
The height of the nose at the end of the nostrils	.... 2
The distance between (the pupils of) the two eyes	.... 4
The length of the sockets of eyes and eyes, each	.... 2
The diameter of the ball of the eye	.... 1/3rd of the above.
The diameter of the vision of the pupil	.... 1/5th of the eyes.
The width of the eye ¹⁸³	.... 1
The length of the line of the eye-brows from one end to another	.... 10
The width of the brow	.... ½
The intervening space between the two brows	.... 2
The length of each brow ¹⁸⁴	.... 4
The extent of the hair-line on the forehead	.... 10
The width of the hair-line on the forehead	.... ½
The measure of the <i>karavīraka</i> (inner corner) of the eye ^{184a}	.... 1
The periphery of the head	.... 32
The width of the head	.... 14
But it is stated that in a picture only 12 <i>aṅgulas</i> are visible, the remaining 20 <i>aṅgulas</i> being invisible. ¹⁸⁵	But according to Nagnajit, the face including the full comple- ment of the hair is 16 <i>aṅgulas</i> long. ¹⁸⁶
The width of the neck	.... 10

The limb measured	Measurements in its own <i>angulas</i>
The girth of the neck ¹⁸⁷	21
The interstice between the lowermost part of the throat and the heart, between the heart and the navel, and between the centre of the navel and the penis,—each ¹⁸⁸	12
The length of the thighs	24
The length of the shanks	24
The length of the patella	4
The height of the feet ¹⁸⁹	4
The length of the feet	12
The width of the feet	6
The length of the great toe	3
The periphery of the great toe	5
The length of the second toe (<i>pradeśinī</i>) ¹⁹⁰	3
The length of the remaining toes should be 1/8th less in succession ....	....
The height of the great toe ¹⁹¹	1¼
The measure of the nail of the great-toe	¾
The measure of the nails of the rest of the toes ¹⁹²	½ or a little less
The circuit of the shanks at the top-end	14
The breadth of the same at the same place	5
The breadth of the shanks in the middle	7
The circuit of the shanks in the middle. ¹⁹³	7×3 = 21
The width of the knees in the middle	8
The circumference of the same at the same place	8×3 = 24
The width of the thighs in the middle	14
The circumference of the thighs in the middle ¹⁹⁴	28
The width of the pelvis	18

The limb measured	Measurements in its own <i>aṅgulas</i>	
The circuit of the same	44
The depth of the navel	1
The diameter of the same ¹⁹⁵	1
The periphery of the middle part of the body at the centre of the navel	42
The interstice between the nipples	16
The distance between the paps and the arm- pits above them in an oblique direction ¹⁹⁶	6
The interstice between the neck and the end of the shoulder	8
The length of the arms	12
The length of the fore-arms	12
The breadth of the arm	6
The breadth of the fore—arm ¹⁹⁷	4
The circumference of the arms at the top end	16
The breadth of the wrist	12
The width of the palm	6
The length of the palm ¹⁹⁸	7
The length of the middle finger ¹⁹⁹	5
The length of the forefinger	Less than the middle finger by half a digit of the latter.	
The length of the ring finger	The same as that of the fore- finger.	
The length of the little finger ²⁰⁰	Less than the ring-finger by a digit of the latter.	
The thumb consists of two digits, while other fingers have 3 digits.		
The length and breadth of a nail should be a half of the joint of the finger concerned. ²⁰¹		

II. MUSIC

Vocal and Insrumental Music

Varāhamihira shows acquaintance with both vocal (*gīta*,⁶ *geya*⁷) and instrumental (*vādyā*, *BJ*, XVIII.1; *vādita*, XXXIII.23; *vāditra*, XLIII. 16; LXXXV.22) music and refers to persons favourably inclined towards vocal music (*gītapriya*, C.12; *BJ*, XIV.4; XVI.12; XVII.3; *geyasakta*, V.39, 74), expert musicians (*gāndharva*, XXXII.11; XV.12; *gāndharvavid*, XVI.17; XIX.10), vocalists (*geyajña*, X.3 XIX.6) and instrumentalists (*vādaka*, X.3). Songs were sung to the accompaniment of musical instruments as the lute, flute and *paṇava* (XIX.18; YY, II.19). Sounds produced by singing and musical instruments are contrasted (XXXIII.23; XLV.60; LXXXV.22, 39). We read of the futility of a good lyre for a man with defective voice (*Vyarthā sadoṣasya guṇ-anvit-āpi viṇ-eva śabd-āśraya-varjitasya*, YY, II. 15). Music, instrumental and vocal, played a definite role in religious ceremonials (XLII.24, 26; XLIII.7, 16; XLVII. 49; LIX.10, 16). A band of musical instruments accompanied a military march (XLIII.23; YY, XIII.4).

Svaras and Grāmas

The use of the word *svara* in the sense of 'seven' (XII.14; *PS*, I.15) shows that the standard number of musical notes was recognised to be seven, the first four of which are mentioned by name, viz., *Ṣaḍja*, *Madhyama*, *Gāndhāra*, *Ṛṣabha*.²⁰⁴ Indian music is traditionally based on the three *grāmas*. It is held by some that only two of them are named in earlier literature, while the *g-* *grāma* is mentioned only by mediaeval writers. H.A. Popley, for example, states that *ṣ* (*Ṣaḍja*) and *m* (*Madhyama*) *grāmas* are found in the *Nāṭyaśāstra* of Bharata, while the *g-* (*Gāndhāra*) *grāma* is not mentioned until Ratnākara (c. 1247 AD). This statement is not quite correct, for Varāhamibira names all the three *grāmas* (*grāmau madhyama-ṣaḍjau ca gāndhāras=c-eti śobhanāḥ* LXXXV.40).²⁰⁵

Musical Instruments

Varāhamihira alludes vaguely to the beaten instruments in XLV.61 which mentions the sounding of the *tūryas* without their being struck and the absence of sound even when they are struck as a portent (*Anabhihata-tūrya-nādaḥ śabdo vā tādīteṣu yadi na syāt*). Among musical instruments we find mention of the lute (*viṇā*²⁰⁶, *vallakī*²⁰⁷), flute (*veṇu*),²⁰⁸ *paṇava*,²⁰⁹ trumpet (*tūrya*²¹⁰), tabor (*mṛdaṅga*²¹¹,

*muraja*²¹²), conchshell (*śaṅkha*²¹³), gong (*ghaṇṭā*²¹⁴) and various kinds of drums such as *paṭaha*²¹⁵, *bheri*²¹⁶, and *duṇḍubhi*.²¹⁷ The word *tūrya* sometimes appears to have been used in the sense of musical instruments in general.²¹⁸ For libidinous people the music of *vallakī* inspiring tender feelings was verily the food of love (LXXV.2).

***Diṇḍibhāṇḍa* (LXXXVI.12)**

The term *diṇḍibhāṇḍa* conveys the idea of a kind of musical concert wherein instrumentalists played on *paṭaha*, *mṛdaṅga* and *karāṭa* (*diṇḍibhāṇḍāni vāditra-viśeṣāḥ*, *paṭaha-mṛdaṅga-karāṭāḥ samavetā yatra vādyante tāni diṇḍibhāṇḍāni*, Utpala).²¹⁹

III. PAINTING

Painting is referred to as *citra-karma* (LVII.14) and painters as *citra-kara* (V.74; IX.30), *citrajña* (X.10) and *ālekhyaja* (XVI.17). Cloth is mentioned as a painting material (YY, VI.10). Perfumed colouring substances were used for painting (XLVII.27). Drawing the figures of monsters, ghosts or house-owner with charcoal, red chalk, etc., in a house was regarded as inauspicious (XLV.77). In sculpture, the head was shown 32 *aṅgulas* in circumference and 14 *aṅgulas* in length, while in a picture only 12 *aṅgulas* (of circumference) were to be visible and the remaining 20 invisible (LVII.14).

Notes and References

1. Cf. *Aṣṭāliṅgi* IV.3.73; Agrawala, *India as Known to Pāṇini*, p.337; *Brahmajālasutta* (Engl. transl. by Rhys Davids), pp.16-18, fn.; *Āśvalāyanāgṛīyasūtra*, II.7.1; *Amara*, II.3.19 (a building-site); *Halāyudha*, V.290 (*vāstu* in masculine denotes a house-site and in neuter a house proper); P.K. Acharya, *Dictionary of Indian Architecture*, p.548.
2. *Gr̥ham kṣetram*=*ārāmas*=*setubandhas*=*taṭākam*=*ādhāro vā vāstu*.
3. Cf. *Mānasāra*, III.2-3; *Agni-purāṇa*, CVI.1; P.K. Acharya, *Dictionary*, pp.545-46.
4. Figures in brackets refer to the serial number of verses in Ch.LII.
5. Cf. *Matsya*, CCLIV.18-9.
6. According to the *Matsya-purāṇa* (CCLIV. 21-2), however, the houses of feudatory chiefs and *amātyas* should measure 48, 44, 40, 36 and 32 cubits in width, the length exceeding the breadth by 1/4th. It also gives somewhat different proportions for the houses of chamberlains, artistes and prostitutes, the best structure of this class measuring 28 *h.* x 56 *h.* (CCLIV.23-4).

7. *Matsya-purāṇa* (CCLIV.24-5) also prescribes 12 *h.* for the width of the best structure of this group, the remaining four diminishing from each other by $\frac{1}{2}$ cubit and the length exceeding by $\frac{1}{4}$ th.
8. Cf. *Matsya*, CCLIV. 30-31.
9. V.S. Agrawala, *Harṣacarita, A Cultural Study* (Hindi), pp.64, 85, 95, 208.
10. V.S. Agrawala, *Kādambarī, A Study* (Hindi), pp.74, 81.
11. *Ajanta Paintings* (Lalit Kala Academy), 1956, Pl.XX.
12. But cf. *Matsya*, CCLIV. 28-30, where the length of a Vaiśya's house is said to exceed the width by $\frac{1}{3}$ rd.
13. Cf. Utpala on LII.14 :— अत्र यदा ब्राह्मणो राजपुरुषो भवति तदा ब्राह्मणवास्तुमानं सेनापतिवास्तुमानादपास्य यदवशिष्यते तेन मानेन गृहपञ्चकं कार्यम्। एवं क्षत्रियादीनां विज्ञेयम्। किन्तु सेनापतिगृहस्य द्वितीयस्य क्षत्रियवास्तुमानेन सहान्तरं कृत्वा शेषं क्षत्रियराजपुरुषस्य प्रधानगृहम्। एवं तृतीयस्य द्वितीयेन चतुर्थस्य तृतीयेन पञ्चमस्य चतुर्थेनेति। एवं तृतीयेन सेनापतिगृहेण सहान्तरं वैश्यस्य प्रधानगृहं चतुर्थेन शूद्रस्येति।
14. In lexicons '*alinda*' denotes a room in the outer gateway of a building for which older words were '*praghāṇa*' and '*praghaṇa*', cf. Pāṇini, III.3.79; *Amara*, II.2.12. According to some, the word '*alinda*' originated in the Gupta period or a little earlier, cf. Agrawala, *Harṣacarita, A study*, p.204. But Utpala takes '*alinda*' to mean a lattice-covered path beyond the wall of a hall and facing the courtyard: अलिन्दशब्देन शालाभित्तेर्बाह्या या गमनिका जालकावृताङ्गणसम्मुखा क्रियते सा ज्ञेयेति।
15. हस्तद्वान्त्रिंशदिषु चतुश्चतुस्त्रिक्रिकाः शालाः।
सप्तदशत्रितयतिथित्रयोदशकृताङ्गुलाभ्यधिकाः॥
त्रिद्विद्विसमाः क्षयक्रमादङ्गुलानि चैतेषाम्।
व्येका विंशतिरष्टौ विंशतिरष्टादश त्रितयम्॥

LII.18-19

Utpala interprets '*kṣaya-kramāt*' as 'in accordance with the descending order of the houses the *angulas* increase'. According to others, 'as the *angulas* increase, the *hastas* decrease in number'. Utpala tells us that this interpretation was rejected by expert architects:—एवमेतेषां हस्तानां क्षयक्रमाद् गृहक्रमेणैतान्यङ्गुलान्यधिकानि कार्याणि ... अन्ये एवं व्याचक्षते। यथा एतान्यङ्गुलानि क्षयो हानिरेषां हस्तानां कार्यः। एतद् वृद्धस्यपतिभिर्नाङ्गीकृतम्।

16. *Śreyocchraya* of *Matsya-purāṇa*, CCLIV.37.
17. Cf. *Viśvakarma-prakāśa*, II.154-155.
18. Cf. *ibid.*, II.161
19. Cf. *Matsya*, CCLIV.42-43, which gives no clear sense:—

गृहव्यासस्य पञ्चाशदष्टादशभिरङ्गुलैः।

संयुक्तो द्वारविष्कम्भो द्विगुणश्चोच्छ्रयो भवेत्॥

20. Utpala informs us that the threshold and upper block were commonly known as '*dehali*' and '*niṭāla*' respectively—*Udumbarau śikhayam uparyuṇāṭhaḥ ūṭhaḥ dehaliḥ niṭālākhye*. T. Bhattacharya points out that the natural depth of the threshold

ought to be the same as that of the jamb, otherwise the frame cannot be well joined and suggests that the word 'sārdham' should be taken to mean 'with' and not 1½ as done by Utpala, *vide* his *Study on Vāstuvidyā*, p.237.

21. The *Matsya-purāṇa* (CCLV.10-14) list of *vedhas* also includes a peg, a house, a house of an outcaste, and refuge. some of these rules appear to have been meant to secure privacy and peace. The *Gobhila-grhyasūtra*, IV.7.17-9, speaks of a back door with disapproval and states that the main door of a house should not face that of another house and that the door should be such that through it the inmates or valuables of the house are not visible to outsiders—*Na pratyag= dvāram karvīta, anudvāram ca grha-dvāram, yathā na samloki syāt*.
22. Cf. *Matsya-purāṇa*, CCLV. 15-18.
23. Utpala adds figures of lions, tigers, swans and birds like *Jivajīvaka*.
24. Cf. *Matsya*, CCLV.1-2, according to which the column should be in thickness equal to an 80th part of seven times the height of a storey and the thickness at the top should be an 80th part of nine times its height—
कृत्वा स्वभवनोच्छ्रायं सदा सप्तगुणं बुधैः। अशीत्यंशः पृथुत्वे स्यादग्रे नवगुणे सति॥
25. In some early inscriptions pillar-base is called *Kumbhaka*, cf. *Lüders List*, Nos. 62, 125q, 125r, 125s, 125t, 125u, 126.
26. स्तम्भं विभज्य नवधा वहनं भागो षटोऽस्य भागोऽन्यः।
पद्मं तथोत्तरोष्ठं कुर्याद् भागेन भागेन॥

LII.29.

27. Cf. Utpala—उह्यते धार्यते भूमौ येन स्तम्भभागेन तद्वहनम्। अस्य भागस्योपर्यन्यो यो द्वितीयो भागः स षटस्ततोऽन्यः पद्मं कमलं पद्माकारमेव कार्यम्। तथा तेनैव प्रकारेण पद्मस्योपरि यो नवमो भागः स उत्तरोष्ठः कार्यः। उत्तरोष्ठी यत्र शोभार्थं रूपकविशेषाः क्रियन्ते। एवं पद्मं भागेनोत्तरोष्ठं च भागेन कार्यम्। केचिदुत्तरोष्ठमष्टमभागे नवमे कमलमितीच्छन्ति। एतदुक्तं भवति। नवधा विभक्ते स्तम्भेऽवरोर्ध्वभागचतुष्केऽधो हिरण्यादीनि कार्याणि शेषं भागपञ्चकं समचतुरस्रादिकं कार्यम्।
28. स्तम्भसमं बाहुल्यं भारतुलानामुपर्युपर्यासाम्।
भवति तुलोपतुलानामूनं पादेन पादेन॥

LII.30.

Cf. Utpala—स्तम्भस्योपरि यत्तिर्यक् कृत्वा काष्ठं दीयते तद् भारतुलासंज्ञम्। प्रासादादिषु स्तम्भानां बहुत्वाद् भारतुला इति बहुवचननिर्देशः कृतः। भारतुलाया उपरि यदन्यत् काष्ठं दीयते तत् तुलोपतुलासंज्ञम्। ... वीप्साकरणात्केचिच्चतस्र इति वर्धयन्ति। भारतुला उपतुला तुलोपतुला चेति। आसां भारतुलातः पादेन पादेनोनं बाहुल्यं कार्यम्। ताश्चोपर्युपरि दीयन्ते इति।

29. स्तम्भस्य नवमांशेन पद्मकुम्भान्तराणि तु।
स्तम्भतुल्या तुला प्रोक्ता हीना चोपतुला ततः॥
त्रिभागेनेह सर्वत्र चतुर्भागेन वा पुनः।
हीनं हीनं चतुर्थांशात् तथा सर्वासु भूमिषु॥

Matsya, CCLV. 5-6.

30. *Dictionary of Indian Architecture*, p.650; *Indian Architecture*, pp. 126-27.

31. विभज्य नवधा स्तम्भं कुर्यादुद्धनं घटम्।
कमलं चोत्तरोष्ठं च भागे भागे प्रकल्पयेत्॥
32. *Study on Vāstuvidyā*, pp. 202-04.
33. Percy Brown, *Indian Architecture*, I, Pl, XXI.
34. *Ibid.*, Pl.XXIX.
35. *Ibid.*, Pl.XIX.
36. *Ibid.*, p.59, XLII.
37. Cf. *Matsya-purāṇa*, CCLIV.1
38. *El*, II, No.XVI; p.203, p.209, No. XXXVII. In a Mathura inscr. of Vikrama 1080, 'caturbimba' is used in place of 'sarvatobhadrikā', cf. *El*, II, p.211 No.XXXIX.
39. Cf. *Kāmikāgama*, XXXV.88—*sarvatobhadram=aṣṭ-āsyam*, P.K. Acharya, *Dictionary*, pp.624-25.
40. Cf. *Matsya-purāṇa*, CCLIV.2.
41. Cf. *Matsya-purāṇa*, CCLIV.3. In S. Indian works this term was applied to a class of joinery, phallus and *śālās*, cf. *Mānasāra*, XVII.84; XXXV.4; LII.4; *Kāmikāgama*, XXXV.88.
42. According to the *Matsya-purāṇa* (CCCLIV.3), on the contrary, *Svastika* is a *catuśśāla* house without a door on the eastern side—*Pūrva-dvāra-vihīnaṃ tat svastikaṃ nāma viśrutam*. All the printed editions of *BS* give the reading 'prāg-dvāraṃ svastikaṃ śubhadam' (LII.34). The discrepancy between the *Matsya-purāṇa* and our text could be easily resolved by assuming that this reading is an error for 'svasti ke=śubhadam'. But the following extract from Garga cited by Utpala conclusively shows that the printed reading is correct:—*Paścimo=ntagato=lindaḥ prāg=antaḥ dvāra tad=utthitau/Anyas=tan=madhya-vidhṛtaḥ prāg=dvāraṃ svastikaṃ śubham*.
43. Cf. *Matsya*, CCLIV.4.
44. Cf. *Mṛcchakatika*, Act III (Cārudatta had a *catuśśāla* house); *Amarakoṣa*, II.1. 10-11 (mentions *Svastika*, *Sarvatobhadra*, *Nandīvārtā* and *Vicchanda*). For an epigraphic reference to *catuśśāla* structures, Cf. *ASWI*, IV, p.99, Nasik No.5,1.1.
45. Cf. *Matsya-purāṇa*, CCLIV.4, where it is styled 'Dhānyaka'.
46. *Viśāla* of *Matsya*, CCLIV.6.
47. *Dhāna* of *Matsya*, CCLIV.11
48. For trees whose presence near a house was approved or proscribed, see *supra*, p.273.
49. Cf. *Matsya-purāṇa*, CCLIII.16-17; *Mānasāra*, V. 34-37; *Samarāṅgaṇa-sūtradhāra*, VIII. 67-68; *Viśvakarma-prākāśa*, I.61.
50. Cf. *ibid.*, I.62. The *Mānasāra* shows a strict attitude in the matter. According to it, the pit was filled with water, if there remained some water after 24 hours,

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- the selected site was considered to be fit for receiving a building, cf. P.K. Acharya, *Dictionary*, p. 453.
51. But cf. *Matsya-purāṇa*, CCLIII. 11-13, which assigns the pungent taste to the Kṣatriyas and astringent one to the Śūdras. These rules were much elaborated in later times and the earth was examined with regard to its touch and sound also, cf. *Samarāṅgaṇa-sūtradhāra*, VIII. 48-51.
 52. According to the *Matsya-purāṇa*, CCLIII. 13-5, if all the four wicks burn equally long, the site was called 'sāmūhika' (collective) and was fit for the houses and temples of the four castes. Also cf. *Viśvakarma-prakāśa*, I.62-64a.
 53. Cf. *Viśvakarma-prakāśa*, I. 69. The *Samarāṅgaṇa-sūtradhāra*, VIII.73, prescribes keeping flower-garlands.
 54. E.g. *Gobhila-grhyasūtra*, Bk. IV, Ch.VII, 4, 20-23.
 55. Cf. *Matsya*, Ch.CCLIII; *Bhaviṣya*, Ch. CXXX; *Samarāṅgaṇa*, Ch.VIII. Cf. D.N. Shukla, *Hindu Science of Architecture*, pp.139-45.
 56. Cf. *Mānasāra*, Chs. IV-V.
 57. Cf. *Matsya*, CCLIII. 17-19, which mentions ploughing and sowing as a test.
 58. Cf. *Manu*, V. 124, where the stay of cows for a day and night is mentioned as one of the five ways of purifying the soil.
 59. The line was to be drawn with the thumb, middle finger or forefinger and with gold, a precious stone, silver, pearl, curd, fruit, flowers or coloured rice (*akṣata*). A line drawn by a weapon, iron, ashes, straw, wood, feet, hide, charcoal, bone or tooth and in an anti-clock-wise order was regarded as inauspicious and so were harsh speech, spitting and sneezing (99-102). Cf. *Matsya*, CCLIII.19-20, according to which the demarcating line may be drawn with flour.
 60. Cf. *Matsya*, CLIII.21; *Samarāṅgaṇa*, XIII.3. But *contra Samarāṅgaṇa*, XIII.5, which says that royal camps, villages, towns, etc. should be laid in accordance with the plan of 64 squares.
 61. The plans of 64 and 81 squares are 8th and 9th in the *Mānasāra*, VII. 9-10.
 62. *Matsya*, CCLIII.19 ff. also mentions only these two plans.
 63. Stella Kramrisch observes that 'the relation of the Vāstu-Puruṣa to the site-plan, ground-plan and vertical section of any building is similar to that of the tonic and any musical composition. The Vāstu-Puruṣamaṇḍala gives the principle of all planned architectural forms and the prototype of its various rythms', vide her *Hindu Temple*, I. p. 22.
 64. Utpala on LII.55-6:— अत्राचार्येण चतुरसे क्षेत्रे वास्तुनरः प्रदर्शितः न वृत्तषडश्र्यष्टादशाश्रिषोडशाश्रीणां। लोके च गृहग्रामनगराणि दृश्यन्ते। तद्यथा अनेनैवाचार्येणोक्तम् :-तत्र षडश्रिर्मरुः। वृत्तः समुद्रगनामा इत्यादि। तथा भरतमुनिना त्रयस्रं वृत्तं गृहमुक्तम्। तस्मादन्यशास्त्रादानीय प्रसङ्गादस्माभिरिह प्रदर्श्यते। तद्यथा :-
एकाशीतिपदे क्षेत्रे कर्तव्यं वृत्तपञ्चकम्। बाह्ये वृत्तद्वयं यत्तत्पदद्वान्निंशता युतम्॥
तृतीयं द्वादशपदं चतुर्थं तु चतुष्पदम्। केवलं पञ्चमं कार्यं ब्रह्मा पञ्चस्ववस्थितः॥
शिख्यादयस्तु द्विपदा बहिर्विष्कम्भसंस्थिताः। अर्यमाद्याः सुराः सर्वे पदिकाः परिकीर्तिताः॥

इति वृत्तक्षेत्रे एकाशीतिपदे।
 वृत्तानि चत्वारि समानि कृत्वा वास्तोश्चतुःषष्टिपदस्य सम्यक्।
 अधस्तदर्धेन च सूर्यवेदैर्विभज्यते वृत्तचतुष्टयं च॥
 शिख्यादयश्चैकपदे निविष्टाः पदद्वये चार्यमकादयश्च।
 आपादयश्च त्रिपदाः प्रतिष्ठाश्चतुष्पदश्चात्र पितामहः स्यात्॥
 इति वृत्तक्षेत्रे चतुःषष्टिपदे। एवमेव षडश्रिप्रभृतीनां विन्यासः कार्यः।
 त्र्यस्रे क्षेत्रे चः—
 त्र्यस्राणि पञ्च क्षेत्राणि त्रिकोणे परिकल्पयेत्॥
 प्राची दिगष्टधा कार्या कोणवर्ज्या ततः परे।
 रविभागविभक्ते ते वास्तुद्वाराणि तानि तु॥
 दितिं वायुं जलपतिं कोणेषु त्रिषु विन्यसेत्।
 ततः शिख्यादिकान् सर्वान् शेषेषु विनिवेशयेत्॥
 द्वितीये पूर्ववद् भागाः षोडश द्विगुणास्ततः।
 तत्रापि कोणत्रितये पूर्वोक्तान् विबुधान् न्यसेत्॥
 शेषेषु वास्तुकोष्ठस्थान् सुरांश्च विनिवेशयेत्।
 क्षेत्रे तृतीये चत्वारि सर्वशाखासु कारयेत्॥
 प्राग्गतिर्यमसावित्रौ सविता च ततः परम्।
 विवस्वानिन्द्रमित्रा च जयश्चैव हरस्तथा॥
 राजयक्ष्मा भूमिधर आपो वत्सयुतः स च।
 चतुर्थे पञ्चभिर्भागैः कृत्वा तन्मध्यगस्तथा॥
 पितामहो विनिर्दिष्टस्त्र्यस्रक्षेत्रेऽप्ययं विधिरिति।

65. Cf. Utpala—रोगाद्वायुमित्यादिकं सूत्रषट्कं वंशशब्देनोच्यते।... शिराशब्देन पूर्वापरायता दक्षिणोत्तरायताश्च दश दश रेखा ज्ञेयाः।
66. अत्राचार्येण वंशानां रज्जूनां च विभागो नोक्तः समासेन रोगाद्वायुमिति सूत्रलक्षणं कृतम्। तथा चास्मदीयवास्तुविधायाम् :—
 रोगाद्वायुं नयेत् सूत्रं पितृतोऽयं हुताशनम्।
 एतत्सूत्रद्वयं प्रोक्तं मुनिभिर्विशसंज्ञितम्॥
 वितथाच्छेषकं चान्यद् भृशं मुख्यात्तथा नयेत्।
 जयन्ताद् भृङ्गराजाख्यं सुग्रीवमदितेस्तथा॥
 एतच्चतुष्टयं प्रोक्तं रज्जुसंज्ञं मनीषिभिः।
67. Scratching a limb or limbs or an ill omen at the time of a query and a defect in the fire while offering an oblation to a constituent deity of Vāstunara was supposed to indicate the presence of a peg in the corresponding limb of the House-God (LII.59). P.K. Acharya takes it to imply 'that certain parts of the ground-plan should be reserved as sacred places', cf. *Mānasāra*, Engl. tr., p.55, fn.3.
68. Cf. Utpala—एतदुक्तं भवति। प्राग्दक्षिणस्यां दिशि शिलान्यासं कृत्वा ततो दक्षिणस्यां ततो नैर्ऋत्यां ततः पश्चिमायां ततो वायव्यां तत उत्तरस्यां तत ऐशान्यां ततः पूर्वस्यां दिशि शिलान्यासं कुर्यादिति। केचिदुत्तरपूर्वं कोणे कृत्वा पूजां शिलां न्यसेत् प्रथममिति पठन्ति। उत्तरपूर्वं चैशानकोणे शिलान्यासं कृत्वा ततः शेषाः प्रदक्षिणेन न्यस्या इत्येतल्लोके स्थपतिषु दृश्यत इति।
69. The use of *dhava*, *vibhātaka*, *nimba* and *araṇi*, of the trees that are thorny, milky, laden with fruits, broken, withered or burnt, and of those that abound in birds'

nest and grow at cremation ground or near a temple was disapproved, cf. LIII.84, 118.

70. Cf. Utpala—*Gṛhadhūmo*'=*gāradhūmaḥ śyām—eti prasiddhaḥ*.
71. LVI.8. This plaster is attributed to Māya.
72. M.M. Ganguli, *Orissa and her Remains*, pp.135 ff.
73. *Ancient India*, No.6 (January, 1950), pp.103-04.
74. LII.59. Cf. *Matsya*, CCLIII.22 et seq.
75. Utpala says that only the internal gods of *Vāstupuruṣa-maṇḍala* were worshipped—*Atra sāmānyen-oktaṁ pūjit-āmaram tathāpi vāstumadhyagatā amarāḥ pūjanīyā na bāhyasthāḥ Śikhi-Parjanya—ādayo=ryam-ādyā vā*.
76. LV.19, 31, LVI.4; LXXXV.17; LXXXVIII.6; XCIV.5, 34.
77. CII, III, p.160, II. 6-7; p.81, I.7; p.162, 16; p.276, I.11.
78. IX.42; LVIII.2; XCV.4.
79. LXXXVIII.4.
80. LII.118. Cf. *devānām ālayaḥ* in LV.2.
81. LV.1, 9, 10.
82. LII.87; LXVII.49; YY (V.R. Pandit's ed.) XV.20.
83. LII.116.
84. LVII.3.
85. L.4; LIX.16.
86. CIII.62.
87. IV.2; LXXXVIII.8; XCV.4; BJ, V.13, 19; XXV.4; PS, XIII. 36; YY, II.5.
88. Cf. *Śāṅkhāyana-śrautasūtra*, XVI.13-17 (*prāsādas* on all sides of *āhavanīya* fire); Patañjali's *Mahābhāṣya*, II.2.34 (*prāsādā Dhanapati-Rāma-Keśavānām*); Bhilsa Garuḍa pillar inscr. of about 2nd century BC (*uttāma prāsāda* of Bhagavat); *Vaijayanta prāsāda* represented in a relief panel from Bharhut, Coomaraswamy, *History of Indian and Indonesian Art*, Fig.43.
89. Cf. *Āpastamba-grhyasūtra*, vii.20, which refers to the carrying of images by the householder and placing them in huts built for the purpose.
90. For caste-wise selection of the site, see LII.89, 92-95; LV.9.
91. अष्टाष्टकपदमथवा कृत्वा रेखाश्च कोणगास्तिर्यक् ।
ब्रह्मा चतुष्पदोऽस्मिन्नर्धपदा ब्रह्मकोणस्थाः ।।
अष्टौ च बहिष्कोणेष्वर्धपदास्तदुभयस्थिताः सार्धाः ।
उक्तेभ्यो ये शेषास्ते द्विपदा विंशतिस्ते हि ।।
चतुःषष्टिपदं कार्यं देवतायतनं सदा ।

LII. 55-6; LV.10.

For the enumeration of the deities, see LII.43-48.

92. CASR, Vol. X, p.105.
 93. *The Gupta Temple at Deogadh*, MASI, No.70, p.5, Pl.II.
 94. See *supra*, p.390.
 95. यो विस्तारो भवेद् यस्य द्विगुणा तत्समुन्नतिः।
 उच्छ्रायाद् यस्तृतीयांशस्तेन तुल्या कटिः स्मृता॥

LV.11

According to Utpala, *kaṭi* is the starting point of the temple above the steps:—*sopān - opari yato devagrhasya prārambhaḥ sā kaṭir-ucyate*.

96. *Vistār-ardham bhaved=garbho bhittayo=nyāḥ samantataḥ*, LV.12. Utpala tells us that an open circumambulatory path should be left between the *garbhagrha* and the walls:—*Hastatrayaṁ bhramaṇāya sarvāsu dikṣu=anāvṛtaṁ sthāpayitvā śeṣaṁ bhitti=avaśṭabdhāṁ kuryāt*.
 97. MASI, No. 70, p.6.
 98. Percy Brown, *Indian Architecture, Buddhist and Hindu*, p.60.
 99. CASR, X, pp.70-71.
 100. ASI, NIS, Vol. LI (1931), p.144, fig. 93.
 101. CASR, XI, p.46.
 102. MASI, No.70, p.12, Pl.XI (a).
 103. CASR, IX, pp.43-44.
 104. द्वारमानाष्टभागोना प्रतिमा स्यात् सपिण्डिका।
 द्वौ भागौ प्रतिमा तत्र तृतीयांशश्च पिण्डिका॥

LV.16.

105. भूमिकाङ्गुलमानेन मयस्याष्टोत्तरं शतम्।
 सादूर्ध्वं हस्तत्रयं चैव कथितं विश्वकर्मणा॥
 प्राहुः स्थपत्यश्चात्र मतमेकं विपश्चितः।
 कपोतपालिसंयुक्ता न्यूना गच्छन्ति तुल्यताम्॥

LV.29-30.

106. त्रिपञ्चसप्तनवभिः शाखाभिस्तत्प्रशस्यते।
 अधः शाखाचतुर्भागे प्रतीहारौ निवेशयेत्॥
 शेषं मङ्गल्यविहगैः श्रीवृक्षैः स्वस्तिकैर्घटैः।
 मिथुनैः पत्रवल्लीभिः प्रमथैश्चोपशोभयेत्॥

LV.14-5.

- 106a. R.D. Banerji, *The Temple of Śiva at Bhumara*, MASI, No.16, p. 45, Pl.IIIa; CASR, X, p.86.
 107. *Ibid.*, p.47.
 108. *Ibid.*, p.50, Pl.XVII.
 109. MASI, No.70, pp.12-13, Pl.IXa.

110. *ASI, AR, 1924-25, p.98, Pl.XXXII c.*
111. *CASR, X, pp.50-51.*
112. *Classical Age, Pl.XII, fig. 23.*
113. The characteristics of the Gupta style, according to Cunningham, are as follows:—1. flat roofs, without spires of any kind, as in cave temples; 2. prolongation of the head of the door-way beyond the jambs; 3. statues of the river goddesses Gaṅgā and Yamunā guarding the entrance door; 4. pillars with massive square capitals, ornamented with two lions back to back, with a tree between them; 5. bosses on the capitals and friezes of a very peculiar form like Buddhist Stūpas, or bee-hives, with projecting horns; 6. continuation of the architrave of the portico as a moulding all round the building; 7. deviation in plan from the cardinal points. The Tigava temple possesses all the seven characteristics (*CASR, IX, pp.42-44*).
114. *MA SI, No. 70, p.12, Pls. IV, IXa.*
115. *MA SI, No.16, p.5, Pl.IIIb.*
116. *ASI, AR, 1924-25, Pl.XXXIIc.*
117. *The Hindu Temple, Vol.I, p.237.*
118. तत्र षडश्रिमेरुर्द्वादशभौमो विचित्रकुहरश्च ।
द्वारैर्युतश्चतुर्भिर्द्वात्रिंशद्धस्तवितीर्णः ॥ LV.20

Kāśyapa as quoted by Utpala adds that Meru should be crowned by round finials:
द्वात्रिंशद्धस्तवितीर्णं चतुर्द्वारं षडश्रिकम् ।
भूमिकास्तत्र कर्तव्या विचित्रकुहरान्विताः ॥
द्वादशोपर्युपरिगा वर्तुलाण्डैः समायुताः ।
प्रासादो मेरुसंज्ञः स्यान्निर्दिष्टो विश्वकर्मणा ॥

According to Utpala *kuhara* denotes internal windows on the walls of the *garbhagrha*:— *vicitrā nānāprakārā abhyantaragavākṣās=tatra bhavanti*. In the Gupta temples provided with processional path the larger covered chambers are lighted by a trellis or trellises in each of the three side-walls, but in the Nachna example the *garbhagrha* is also lighted by two trellises in two side walls (*Classical Age, p.502*). Though Gupta temples with only one upper storey, e.g., Parvati temple at Nachna (*Classical Age, Pl.XI, fig. 22*) and Lad Khan temple at Aihole (*Ib., Pl.XII, Fig. 24*), are known to us, there is no reason to doubt the existence of 12-storeyed structures described in our work.

Stella Kramrisch (*op.cit.*, pp.271-72) thinks that *asra* means here 'a side or face and not an angle', and that the ground-plan of Meru and the next four structures is not hexagonal but it has six faces, for each of their three sides has a central buttress which is set off from the wall, its face running parallel to that of the wall. According to her, this six-faced form was evolved only recently, and consequently it had the greatest importance at the time when the *BS* was composed.

119. *IA*, XXVI (1897), p.164. fn.11.
120. कनकशिखरवेल्लद्वैजयन्तीसमीरगलपितगगनखेलत्वेचरीचक्रखेदः।
किमपरमिह काश्यां यस्य दुग्धाब्धिचीवल्लयबहलकीर्तः कीर्तनं कर्णमेरुः॥
EL, XII, p. 212; *CII*, IV. pp. 293, 303-04.
121. निर्जित्योर्जितगर्वपर्वतभृतः प्रत्यर्थिपृथ्वीभुजः।
प्राप्तानन्तयशा बभूव नृपतिर्गाङ्गेयदेवस्ततः।
पृथ्वी येन विधाय मेरुमतुलं कल्पद्रुमेणार्थिनां
स्वर्गादूर्ध्वमधः स्थितापि विबुधाधारेयमापादिता॥
EL, II, pp. 11,15; *CII*, IV, pp. 315-18.
122. J. Ph.Vogel, *Antiquities of the Chamba State*, Pl.X.
123. *IA*, 1897, p.164, fn.11.
124. Cf. Kāśyapa cited by Utpala:—
अष्टभौमश्च कैलासो हस्ताष्टाविंशतिः स्मृतः।
षडश्रिः शिखरोपेतः प्रासादस्तु तृतीयकः॥
125. गवाक्षजालसंयुक्तो विमानश्चैकविंशतिः।
षडश्रिष्टभौमश्च प्रासादः स्याच्चतुर्थकः॥
126. Kramrisch, *op.cit.*, Vol. II, p.414.
127. गरुडाकृतिश्च गरुडो नन्दीति च षट्चतुष्कविस्तीर्णः।
कार्यस्तु सप्तभौमो विभूषितोऽण्डैस्तु विंशत्या॥

LV. 24.

Cf. Utpala:—गरुडाकृतिर्गरुडाकारः पक्षी पक्षपुच्छयुक्तः.... नन्दिवर्धनसंज्ञश्च गरुडाकार एव किन्तु पक्षपुच्छरहितः।

and Kāśyapa cited by Utpala:—

गरुडो गरुडाकारः पक्षपुच्छविभूषितः।
नन्दी तथाकृतिर्ज्ञेयः पक्षादिरहितः पुनः॥
कराणां षट्चतुष्कास्तु विस्तीर्णौ सप्तभूमिकौ।
दशभिर्द्विगुणैरण्डैर्भूषितौ कारयेत् तु तौ॥

128. *Candraśālā* is a gabled chamber on or above the *kapota* or the gable window itself, in the latter case *candraśālā* being an abbreviation of *candraśālā-vātāyana*. Coomaraswamy points out that *gavākṣa* in the *Raghuvamśa* VII.11 and XIX.7 is synonymous with it and is the same as modern *jharokhā*, Coomaraswamy, "Indian Architectural terms," *JAOS*, XLVIII (1928), pp.253-54. Utpala takes it to be synonymous with *kuhara* meaning window: *anayor=dvayor=api=valabhī kuharaiś=candraśālā bhavet*.
129. *Classical Age*, p.497, Fig.19.
130. *JAOS*, 1928, p.259 and plate facing it.
131. कुञ्जर इति गजपृष्ठः षोडशहस्तः समन्ततो मूलात्।
गुहराजः षोडशकस्त्रिचन्द्रशाला भवेद्वलभी॥

LV.25.

132. द्वारैर्युतश्चतुर्भिर्बहुशिखरो भवति सर्वतोभद्रः।
बहुरुचिरचन्द्रशालः षड्विंशः पञ्चभौमश्च॥

LV.27.

133. तथा च काश्यपः
शिखरैर्बहुभिर्युक्तश्चतुर्द्वारविभूषितः।
रुचिरैश्चन्द्रशालैश्च बहुभिः परिवारितः॥
चतुरस्रः पञ्चभौमः षड्विंशद्विस्तृतः।
सर्वतोभद्र इत्युक्तः प्रासादो दशपञ्चमः॥

134. Kramrisch thinks that the niches or *rathikābimbās* on the side walls serve the purpose behind the doors.

135. *El*, VIII. 132, 135; P.K. Acharya, *Dictionary of Hindu Architecture*, p.625.

136. *Excavations at Paharpur*, *MAI*, No.55 (1938), p.7.

137. *The Struggle for Empire*, p.639.

138. *Matsya-purāṇa*, CCLXIX, 29,34, 35, 48, 53; Acharya, *Dictionary*, p.408.

139. सिंहः सिंहाक्रान्तो द्वादशकोणोऽष्टहस्तविस्तीर्णः LV.28.

Cf. Kāśyapa:—सिंहः सिंहसमाक्रान्तः कोणैर्द्वादशभिर्युतः।

विष्कम्भादष्टहस्तः स्यादेका तस्य च भूमिका॥

140. चत्वारोऽञ्जनरूपाः पञ्चाण्डयुतस्तु चतुरस्रः। LV.28.

141. एते अञ्जनरूपा अव्यक्तरूपाः सान्धकारा इत्यर्थः। बाह्यप्राकाशं तेषु न प्रविशत्ययमर्थः। देवप्रासादस्य सन्निकृष्टाश्चतसृष्वपि दिक्षु भित्तिः कृत्वा प्रासादस्य पश्चिमभागे द्वारं कार्यम्। ताश्च भित्तय ऊर्ध्वभागे तथा छेदनीया यथा प्रासादोत्पन्ना एव लक्ष्यन्ते न पृथक्स्थाः। तत्र बहिर्द्वारात् प्रविश्य प्रासादस्य वामभागेनागत्य पुरतः प्रासादस्य द्वारं कार्यम्। तत्र मणिमयी प्रतिमा तत्कान्त्या यत्र प्राकाश्यमुत्पद्यते।

142. *List of Ancient Monuments in the Provinces of Bihar and Orissa*, (*ASI*, *NIS*, Vol.LI (1931), p. 143. The Śiva temple (popularly known as Śaṅkarācārya temple) on Takht-i-Suleman at Srinagar consists of a single chamber built on an octagonal basement. The plan of the sanctum is octagonal (square with a double projection on each side), the interior being circular, cf. *ASI*, *AR*, 1915-16, p.72, pls. XLIV-XLVa; Stella Kramrisch, *op.cit.*, I, p.272, fn.68.

143. However, externally the plan of the small temple at Paraoli in Kanpur and at Kurari in Fatehpur district of Uttar Pradesh must have been a 16-sided polygon, the cella being circular in shape, see *ASI*, *AR*, 1908, pp.17, 20, fig.6.

144. LVIII.5-6. An identical list is supplied by Kāśyapa as cited by Utpala.

145. लिंगं वा प्रतिमा वा द्रुमवत् स्थाप्या यथादिशं यस्मात्।

तस्माच्चिह्नयितव्या दिशो द्रुमस्योर्ध्वमथवाऽधः॥

LVIII.7.

Cf. Utpala—अयमर्थः। द्रुमस्य यः पूर्वाभिमुखो भागः स एव प्रतिमायाः पूर्वभागः कार्यः। एवं दक्षिणो दक्षिणः। पश्चिमः पश्चिमः। उत्तरभाग उत्तरभाग एव कार्यः। वृक्षस्य योऽधो भागः स एव प्रतिमाया अधोभागः कार्यः। वृक्षस्य य ऊर्ध्वभागः सोऽपि प्रतिमाया ऊर्ध्वभागः कार्यः। तस्माद्धेतोर्द्रुमस्य वृक्षस्य दिश आशाश्चिह्नयितव्याः। एवमूर्ध्वाधरौ भागावपि चिह्नयितव्यौ।

146. तथा च काश्यपः
वृक्षवत् प्रतिमा कार्या प्राग्भागाद्युपलक्षिता।
पादाः पादेषु कर्तव्याः शीर्षमूर्ध्वं तु कारयेत्॥
147. Some omens were inferred from the direction in which a tree fell. Thus, while a tree falling in the east, north-east or north was taken to augur prosperity, that falling in the south-east, south, south-west, west or north-west foretold outbreak of fire, disease and ruin to the horses, cf. LVIII. 13; XLII. 19-20; LII.120.
148. आयुः श्रीबलजयदा दारुमयी मृण्मयी तथा प्रतिमा।
लोकहिताय मणिमयी सौवर्णी पुष्टिदा भवति॥
रजतमयी कीर्तिकरी प्रजाविवृद्धिं करोति ताम्रमयी।
भूलाभं तु महान्तं शैली प्रतिमाऽथवा लिंगम्॥
- LIX.4-5.
149. G.O.S., Vol.II, I. 1.
150. *DHI*, pp.211-12; *Proceedings of Indian History Congress*, 3rd Session, pp.176-84.
151. *YY*, VI.4; *BY*, XVIII. 3-5.
152. *Ibid.*, XVIII. 6-8.
153. *Ibid.*, XVIII. 9-10. According to *YY*, VI.9, however, it should be made of *rudhirākhyamanī*.
154. *BY*, XVIII. 11-13. According to *YY*, VI.17, it should be fashioned from gold.
155. *BY*, XVIII.14-15. *YY*, VI.18 prescribes *vimalaka-manī* for Bṛhaspati's image.
156. *BY*, XVIII. 16-17. But cf. *YY*, VI.7 (*citra*).
157. *BY*, XVIII. 18-20. *YY*, VI.13 prescribes blue glass (*ñīla-kāca*).
158. *BY*, XVIII. 21-22. The meaning of 'nāga' is not clear. According to *YY*, VI.11, Rāhū should be fashioned from *devadāru* wood!
159. *BY*, XVIII 23-4.
160. Cf. *Yājñavalkya-smṛti*, I.296-298. Also *BJ*, II. 12, which ascribes copper, precious stones, gold, alloy of metals, silver, pearls and iron to the seven planets beginning with the sun.
161. *YY*, VI. 4, 8, 12, 14, 16, 18.
162. See *supra*, Ch.5, Section VI.
163. T.A. Gopinatha Rao, *Tālamāna or Iconometry*, *MASI*, No.3, p.38.
164. यस्मात् काष्ठात् पाषाणादिकाद्वा प्रतिमा क्रियते तद्दृष्ट्यं पीठप्रमाणविवर्जितं द्वादशभागविभक्तं कृत्वा तत्रैको भागो नवधा कार्यः सोऽङ्गुलसंज्ञा भवति। यस्मादष्टाधिकमङ्गुलशतं प्रतिमाप्रमाणं वक्ष्यति, स्वैरङ्गुलप्रमाणैरिति।
165. *MASI*, No. 3, p.38. The *Śukranītisāra* gives another manner of obtaining *mātrāṅgula*. It is one-fourth of one's own fist (*Svasvamuṣṭeś=catrurtho=msō-hy-āṅgulaṁ parikīrtitam*, IV.4.82.
166. दशरथतनयो रामो बलिश्च वैरोचनिः शतं विंशम्।
द्वादशहान्या शेषाः प्रवरसमन्यूनपरिमाणाः॥
- LVII.30.

Cf. Utpala—शेषा अन्याः प्रतिमा द्वादशहान्या द्वादशकद्वादशकहीनत्वेन प्रवरसमन्यूनपरिमाणा भवन्ति । विंशत्यधिकादङ्गुलशताद् द्वादशाङ्गुलान्यपास्याष्टाधिकं शतमङ्गुलानां प्रतिमा प्रधाना भवति । ततोपि द्वादशकमपास्य षण्णवत्यङ्गुलसमा मध्यमा भवति । ततोपि द्वादशकमपास्य चतुरशीत्यङ्गुला न्यूनपरिमाणा प्रतिमा भवति । स्वैरङ्गुलप्रमाणैर्द्वादशविस्तीर्णमायतं च मुखमित्यनेन न्यायेन या प्रतिमोक्ता साष्टाङ्गुलं शतमधिकं भवति यदत्रोक्तं दशरथतनयो रामो बलिश्च वैरोचनिः शतं विंशमित्यस्मिन् द्वादशानामङ्गुलानामधिकानां तैरधिकेन परिमाणः कार्यः सर्वावयवानाम् । एवं हीनत्वेऽप्यनुपात एवेत्यनुक्तं ज्ञायत इति ।

167. The *tāla* and its variations are typically late and South Indian in origin. If this is taken as a criterion of relative chronology of iconometric texts, sections of the *Matsya-purāṇa* (CXLV.10; CCLIX.1-2) and *Śukranītisāra* (IV.4.85 ff) dealing with sculpture and architecture must be later than *BS*.

168. LXVIII.7. See *supra*, pp. 369-70.

169. सौम्या तु हस्तमात्रा वसुदा हस्तद्वयोच्छ्रिता प्रतिमा ।
क्षेमसुभिक्षाय भवेत् त्रिचतुर्हस्तप्रमाणा या ॥

LVII.49.

170. According to the *Matsya-purāṇa*, an image installed in a house should measure between a digit of the thumb and a *vitasti* (a span, 12 *āṅgulas*)—

*Anguṣṭhaparvād=ārabhya vitastim yāvad=eva tu,
Grhe vai pratimā kāryā n—ādhikā śasyate buhaiḥ*

CCLVIII.22.

171. द्वारमानाष्टभागोना प्रतिमा स्यात् सपिण्डिका ।
द्वौ भागौ प्रतिमा तत्र तृतीयांशश्च पिण्डिका ॥

LV.16.

Cf. *Sāmba Purāṇa*, XXXI.6; *Bhaviṣya Purāṇa*, CXXXII.6.

देवागारद्वारस्याष्टांशोनस्य यस्तृतीयोऽंशः ।

तत्पिण्डिकाप्रमाणं प्रतिमा तद्द्विगुणपरिमाणा ॥

LVII.3.

Cf. *Kāśyapa* quoted by Utpala on LV.16 (p.759):—

देवं सपिण्डिकं स्थाप्यं द्वाष्टं शोभितं शुभम् ।

द्वौ भागौ प्रतिमा कार्या तृतीयश्चैव पिण्डिका ॥

172. LVII.29 Cf. *Kāśyapa*, quoted on p.778.

173. नृपभयमत्यङ्गायां हीनाङ्गायामकल्पता कर्तुः ।
शातोदर्या क्षुद्भयमर्थविनाशः कृशाङ्गायाम् ॥
मरणं तु सक्षतायां शस्त्रनिपातेन निर्दिशेत् कर्तुः ।
वामावनता पत्नीं दक्षिणविनता हिनस्त्यायुः ॥
अन्धत्वमूर्ध्वदृष्ट्या करोति चिन्तामधोमुखी दृष्टिः ।
सर्वप्रतिमास्वेवं शुभाशुभं भास्करोक्तसमम् ॥

LVII.50-52.

Cf. last three verses of *Kāśyapa* quoted on p.786.

Cf. also LIX.6: image containing wedge or hole...and *Kāśyapa* quoted on it.

174. स्वैरङ्गुलप्रमाणैर्द्वादश विस्तीर्णमायतं च मुखम्।
नग्नजिता तु चतुर्दश दैर्घ्येण द्राविडं कथितम्।
Utpala quotes Nagnajit : तथा च नग्नजित् :-
विस्तीर्णं द्वादश मुखं दैर्घ्येण च चतुर्दश।
अङ्गुलानि तथा कार्यं तन्मानं द्राविडं स्मृतम्॥

175. LVII.5. Utpala understands *hanu* as 'the two joints of the face and the neck'—*mukha-gala-sandhi hanunī*. T.A.G. Rao (*Tālamāna or Iconometry*, MASI, No.3, p.77, Col.3) renders *hanu* by 'chin', which is unwarranted. Similarly, he gives 'the distance between the tip of the chin from the neck' as 2 *āṅgulas* (*ibid.*), which is not mentioned in the text or commentary.

176. Utpala's explanation of the word *cibuka* is not clear. First, he says that 'the portion of the nose measuring four *āṅgulas* is known as *cibuka*, and next that 'the portion below the mouth is indicated by the word *cibuka*':— *cibuka-grahaṇena nāsāyās=catur=āṅgulo bhāga ucyate... cibuka-śabden-ātra mukhasy-ādhobhāga ucyate*.

177. अष्टाङ्गुलं ललाटं विस्ताराद् द्वयङ्गुलात् परे शङ्खौ।
चतुरङ्गुलौ तु शङ्खौ कर्णौ तु द्वयङ्गुलौ पृथुलौ॥

LVII.6.

Cf. Utpala—शङ्खौ चतुरङ्गुलावधोभागौ दीर्घौ कार्यौ यतः शङ्खाधो गण्डभाग उच्यते।

178. This is based on the joint authority of Varāhamihira and Utpala:—
कर्णोपान्तः कार्योऽर्धपञ्चमे भ्रूसमेन सूत्रेण।

LVII.7.

Utpala—साधानि चत्वार्यङ्गुलानि नेत्रान्तादारभ्य तस्मिन् भ्रूसमेन सूत्रेण नेत्रमध्यगेन कर्णोपान्तः कार्यः।
कर्णस्योपान्तः समीपः।

179. चतुरङ्गुलं वसिष्ठः कथयति नेत्रान्तकर्णयोर्विवरम्।

LXII.8.

Utpala quotes Vasiṣṭha:— तथा च वसिष्ठः। कर्णनेत्रान्तरं यच्च तद्विन्धाच्चतुरङ्गुलम् There is a slip in T.A.G. Rao's table—he mentions Vasiṣṭha, but not the figure 4. There is also a slip in Kern's translation, 'the space between the extreme eye-corner and eyes, at 4 digits', (*JRAS*, 1873, p.324). J.N. Banerjea (*DHI*, p.583) renders this line as follows: 'Vasiṣṭha says that (the space) between the extreme corner of the eye and ear-hole (near it) is 4 *āṅgulas*.' It is defective: he seems to take '*vivaram*' as qualifying '*karṇayoh*', both these words giving him the meaning 'ear-hole'. But '*vivaram*' here is actually an adjective of '*catur-āṅgulam*' and denotes 'the distance' or 'intervening space'. Had it been properly understood, the phrase 'the space' would not have been bracketed. Similarly '(near it)' gives no sense. The correct translation then should be, 'Vasiṣṭha says 4 *āṅgulas* to be the space between the extreme outside end of the eye and the ears.'

180. कर्णस्रोतः सुकुमारकं च नेत्रप्रबन्धसमम्।

LVII.7.

Cf. Utpala—....सुकुमारकं च कर्णस्रोतःसमीपे उन्नतो मार्गस्तन्नेत्रप्रबन्धसमम्। नेत्रप्रबन्धशब्देन प्रदूषिकोच्यते।
तत्समं तत्तुल्यं कार्यम्। अङ्गुलप्रमाणमित्यर्थः।

Kern's quotation of the last part of the second sentence, viz., *pramūṣikocyate* (JRAS), 1873, p.324, fn.1) is faulty. T.A.G.Rao's table omits these proportions.

181. अधरोङ्गुलप्रमाणस्तस्यार्धेनोत्तरोष्ठश्च ।

LVII.8.

182. अर्धाङ्गुला तु गोच्छा वक्त्रं चतुरङ्गुलायतं कार्यम् ।
विपुलं तु सार्धमङ्गुलमव्यातं त्र्यङ्गुलं व्यातम् ।

LVIII.9.

183. द्व्यङ्गुलमितोऽक्षिकोशो द्वे नेत्रे तत्रिभागिका तारा ।
दृक्तरा पञ्चांशो नेत्रविकाशोऽङ्गुलं भवति ।।

LVII.11.

Utpala clearly says that the black-ball of the eye and the vision of the pupil should be 1/3rd and 1/5th of the eye (i.e. of 2 *āṅgulas*) respectively: *tattribhāgikātārā, āṅguladvaya-tribhāgapramāṇā tārā netramadhye kṛṇo bhāgaḥ dṛktārā madhyavartinī kumārī āṅguladvayapañcāṁśaḥ pañcāṁśabhāgaḥ*. In face of this express statement, it is difficult to agree with T.A.G. Rao (*op.cit.*, p.78) who states that the diameter of the pupil should be one-fifth of the black ball, and with J.N. Banerjea (*DHI*, p.584) who says that 'the vision of the pupil is 1/3rd (of the ball).'

184. पर्यन्तात् पर्यन्तं दश भुवोऽर्धाङ्गुलं भुवो लेखा ।
भ्रूमध्यं द्व्यङ्गुलकं भ्रूदैर्घ्येणाङ्गुलचतुष्कम् ।।

LVII.12.

- 184a. कार्या तु केशरेखा भ्रूबन्धसमाङ्गुलार्धविस्तीर्णा ।
नेत्रान्ते करवीरकमुपन्यसेदङ्गुलप्रमितम् ।।

LVII.13.

Cf. Utpala—करवीरकं दूषिकेति प्रसिद्धम् ।

Kern (JRAS, 1873, p.324 fn.2) observes that 'the inner corner, *karavīraka*, is also called *mūṣikā* in a quotation from *Kāśyapa*, but S. Dvivedi's edition (p.777) gives the reading *dūṣikā* and not *mūṣikā*.

185. द्वात्रिंशत् परिणाहाच्चतुर्दशायामतोऽङ्गुलानि शिरः ।
द्वादश तु चित्रकर्मणि दृश्यन्ते विंशतिरदृश्याः ।।

LVII.14.

186. आस्यं सकेशनिचयं षोडश दैर्घ्येण नग्नजिह्वोक्तम् ।

LVII.15.

Cf. Utpala—मुखं दीर्घं चतुर्दशाङ्गुलानि केशरेखा द्वे अङ्गुले एवं षोडश । तथा च नग्नजित् । द्व्यङ्गुला केशरेखैवं मुखं स्यात् षोडशाङ्गुलम् ।

187. ग्रीवा दश विस्तीर्णा परिणाहाद्दिशतिः सैका ।

LVII.15.

188. कण्ठाद् द्वादश हृदयं हृदयान्नाभी च तत्प्रमाणेन ।
नाभीमध्यान्मेढ्रान्तरं च तत्तुल्यमेवोक्तम् ।।

LVII.16.

Cf. Utpala—कण्ठाधोभागादारभ्य हृदयं यावत्... नाभीमध्यान्मेढ्रान्तरं लिङ्गमध्यं च यावत् ।

189. ऊरू चाङ्गुलमानैश्चतुर्युता विंशतिस्तथा जङ्घे।
जानुकपिच्छे चतुरङ्गुले च पादौ च तत्तुल्यौ॥

LVII.17.

Utpala tells us that *jānukapiccha* or knee-caps were popularly called *ekkalaka*: *jānukapicche...ye ca loke ekkalake iti prasiddhe, pādau ca tattulyau tatsmau gulphād=ārabhy-ādhibhāgaś=caturāṅgulaḥ kāryaḥ*.

190. द्वादश दीर्घौ षट् पृथुतया च पादौ त्रिकायताङ्गुष्ठौ।
पचाङ्गुलपरिणाहौ प्रदेशिनी त्र्यङ्गुलं दीर्घा॥

LVII.18.

J.N. Banerjea (*DHI*, p.585) leaves the middle half of the verse untranslated.

191. अष्टांशाष्टांशोनाः शेषाङ्गुल्यः क्रमेण कर्तव्याः।
सचतुर्थभागमङ्गुलमुत्सेधोङ्गुलकस्योक्तः॥

LVII.19.

192. अङ्गुष्ठनखः कथितश्चतुर्थभागोनमङ्गुल तज्जैः।
शेषनखानामर्धाङ्गुलं क्रमात् किञ्चिदूनं वा॥

LVII.20.

193. जङ्घाग्रे परिणाहश्चतुर्दशोक्तस्तु विस्तरात् पञ्च।
मध्ये तु सप्त विपुला परिणाहात् त्रिगुणिताः सप्त॥

LVII.21.

J.N. Banerjea's rendering of the first line, 'The circumference of the extreme top of the shanks is said to be 14 *angulas* long and 5 broad' (*DHI*, p.595), is very ambiguous and gives no sense.

194. अष्टौ तु जानुमध्ये वैपुल्यं त्र्यष्टकं तु परिणाहः।
विपुलौ चतुर्दशोरू मध्ये द्विगुणश्च तत्परिधिः॥

LVII.22.

195. कटिरष्टादश विपुला चत्वारिंशच्चतुर्युता परिधौ।
अङ्गुलमेकं नाभी वेधेन तथा प्रमाणेन॥

LVII.23.

196. चत्वारिंशद्द्वियुता नाभीमध्येन मध्यपरिणाहः।
स्तनयोः षोडश चान्तरमूर्ध्वं कक्ष्ये षडङ्गुलिके॥

LVII. 24.

Cf. Utpala: स्तनयोरूर्ध्वं तिर्यक् कृत्वा षडङ्गुलिके षडङ्गुलप्रमाणे कक्ष्ये कार्ये।

197. अष्टावंसौ द्वादश बाहू कार्यौ तथा प्रबाहू च।
बाहू षड् विस्तीर्णौ प्रतिबाहू त्वङ्गुलचतुष्कम्॥

LVII.25.

198. षोडश बाहू मूले परिणाहाद् द्वादशाग्रहस्ते च।
विस्तारेण करतलं षडङ्गुलं सप्त दैर्घ्येण॥

LVII.26.

Utpala renders *agrahasta as prakṣṭhadeśa*.

199. It is not mentioned by T.A.G. Rao.

200. पचाङ्गुलानि मध्या प्रदेशिनी मध्यपर्वदलहीना।
अनया तुल्या चानामिका कनिष्ठा तु पर्वोना॥

LVII. 27

201. पर्वद्वयमङ्गुष्ठः शेषाङ्गुल्यस्त्रिभिस्त्रिभिः कार्याः।
नखपरिमाणं कार्यं सर्वासां पर्वणोऽर्धेन॥

LVII. 28.

202. XXXIII.23; XLV.60; LXXXV.22, 39; C.12; BJ, XIV.4; XVI.12; XVII.3.

203. V.39, 74; X.3; XIX.6; BJ, XVIII.1.

204. षड्जमध्यमगान्धारा ऋषभश्च स्वरा हिताः।

LXXXV.40; BY, XXIII.36

गान्धारषड्जमृषभः खलु मध्यगश्च यानेश्वराः शुभकरा न तु येऽवशेषाः॥

YY, XIV.20

This is the reading given by J.L. Shastri. It contains many mistakes which should be corrected in the light of the following extract quoted by Utpala on LXXXV.40.—उक्तं च।

गान्धारषड्जऋषभाः खलु मध्यमश्च याने स्वराः शुभकरा न तु येऽवशेषाः।
ग्रामौ शुभावपि हि मध्यमषड्जसंज्ञौ गान्धारगीतमपि भद्रमुशन्ति देवाः॥

205. The *Mahābhārata* (Śāntiparvan, 177.36-37) also names seven musical notes (*Svaras*), viz. Ṣaḍja, Ṛṣabha, Gāndhāra, Madhyama, Pañcama, Dhaivata and Niṣādaka, and adds that the same is present everywhere in the musical instruments like *paṭaha* in the form of three *svaras* (*traī-svarya*).

206. XIX.18; LXVIII.22, 29; YY, II. 15, 19.

207. LXXV.2.

208. XIX.18; YY, II.19.

209. *Ibid.*, II.19.

210. XLII.24; XLIII.7; XLVII.49; LIX.16; LXXXV.39, YY, II.19.

211. IV.19; XLII.59; XLVII.49, 95.

212. LXVIII.22.

213. XLII.24,59; XLIII.7, 16; XLVII.49; LIX.16, etc.

214. LXXXVI.26.

215. XLII.59.

216. XLII.59; LXVII.95.

217. XLII.34; YY, VIII.16.

218. Cf. XLV.60; LIX.10 *nānā-tūrya-ninādaḥ*.

219. Cf. *Manu*, X.49 for the use of the word *bhāṇḍa* in the sense of musical instruments.

Learning and Literature

<i>Jyotiṣa</i> - Tantra, Horā and Saṁhitā; Five Siddhāntas; Horoscopy; Yātrā; Natural Astrology (Saṁhitā); <i>Āṅgas</i> and <i>Upāṅgas</i> ; Greek Influence; Earlier Writers and Works.	430-53
Architecture and Sculpture - Nagnajit; Viśvakarman	453-54
<i>Dāṇdanīti</i>	455-56
<i>Erotics</i>	456
<i>Philosophy</i>	456-57
<i>Religion</i>	457
<i>Palmistry</i>	457-58
<i>Metrics</i>	458-59
Notes and References	459-67



Varahāmiḥira was an encyclopaedic writer and naturally he refers to a host of earlier or contemporary authors not only on astronomy and astrology but on various other subjects also. His equally learned scholiast Bhaṭṭotpala persistently styled him as 'the redactor of entire Jyotiḥśāstra' (*jyotiḥśāstra-saṅgraha-kṛt*), and the author himself makes his position clear in IX.7. He declares, 'Astronomy and astrology are the sciences based on *āgama*; should there be any difference of opinion (among ancient writers), it would not be proper on my part to put forward my view only; I shall, however, state the majority view.'¹ The result is excellent, and his works form a valuable treasure-house of information about works and authors he consulted. His works assume still greater importance from the fact that they are the sole source of our knowledge about many works and their authors who, but for these references, might have irrecoverably been lost to us. We shall detail below, under different heads, the data bearing on the subject.

I

JYOTIṢA

Our author states that the science of Jyotiṣa is divisible into three departments (*skandhas*); the first branch called Tantra deals with the determination by mathematical calculation of the heavenly bodies; the second known as Horā treats of horoscopy or the casting of the horoscope; and the last is natural astrology called Aṅgaviniścaya or Śākhā and that the treatment of the whole course of Jyotiṣa is named Samhitā.² The word *samhitā*, it would appear, is used here in a comprehensive sense to connote the treatment of the whole. Utpala quotes a distich of Garga in which the word *Samhitā* is employed in its wider sense. Thus 'only one who knows Jyotiṣa in its three sections, viz., Gaṇita, Jātaka and Śākhā, is considered to be well-versed in Samhitā'.³ When Alberuni (I.157) states that 'Samhitā means that which is collected, books containing something of everything', he uses the word in its broader connotation. But there are a number of passages wherein it stands in the narrow meaning of the third branch of Jyotiṣa; it is synonymous with Aṅga,⁴ Śākhā or Phalagrantha. Thus Varāhamihira tells us that a real astrologer is one who 'knows both text and meaning of the works on mathematical astronomy, natural astrology and horoscopy (*graha-gaṇita-horā-samhit-ārthavett-eti*)⁵ and the commentator explains Samhitā as Phalagrantha. It is said in another place that only a person fully accomplished in natural astrology can be an efficient diviner (*samhitā-pāragas-ca daiva-cintako bhavati*).⁶ He counsels a monarch desirous of victory to honour and secure the services of an astrologer who properly knows horoscopy, astronomy and natural astrology (Samhitā).⁷ Varahāmiḥira's work on natural astrology is called Samhitā and he so names it in PS,XV.10. Thus he says, 'In the *Samhitā* in the beginning of the chapter on Rāhu's course, I have fully explained to what causes, apart from Rāhu, solar and lunar eclipses are due.' This is evidently a reference to Chapter V of BS. Utpala invariably uses the word *samhitā* in its narrow connotation. Thus *samhitā* has a two-fold meaning: in its comprehensive sense it stands for the treatment of the entire science of Jyotiṣa which is otherwise called *jyotiṣa-saṅgraha*,⁸ while in the limited sense it denotes natural astrology. As we have seen above, Varāhamihira defines the word as having a wider connotation but employs it more often in the narrower sense. The only satisfactory way to resolve this inner contradiction is to assume that the early astronomical works of Garga and others dealt with the whole of Jyotiṣa-śāstra as known in those days and were naturally

called *Samhitā*; but with the growth of astronomical and astrological knowledge a threefold classification set in and then the word *saṃhitā* came to be used as synonymous with *Śākhā* or *phalagrantha* denoting only one of its branches. But at the same time it continued to be used in its broader etymological connotation. Hence the use of the word '*saṃhitā*' in a two-fold meaning.⁹

We may now proceed to enumerate the contents of works belonging to different branches of the science as laid down by our author. To begin with astronomy. Indian astronomical works are usually classified under three heads: 1. *Siddhāntas*, 2. *Tantras* and 3. *Karaṇas*. A clear-cut distinction between them cannot be drawn. According to the popular definition, however, such works as start their calculations from the beginning of the *kalpa* are known as *Siddhāntas*; the *Tantras* reckon their time from the beginning of *Kali* and the *Karaṇas* from any given *Śaka* date.¹⁰ Alberuni (I.155) considers *Karaṇas* to be inferior to *Siddhāntas*. 'Such books', says he, 'as do not reach the standard of a *Siddhānta* are mostly called *Tantra* or *Karaṇa*.' That there can be no hard and fast rule limiting the contents of any class of works is proved by the fact that *Varahāmiḥira* names his only known astronomical treatise, i.e., *Pañcasiddhāntikā*, as a *Karaṇa*, which, as pointed out by *Thibaut*,¹¹ decidedly distinguishes itself from other ordinary works of this class by containing certain contents lying outside the domain of a *Karaṇa*, e.g., constitution of the universe (*Trailokya-saṃsthāna*, Ch.XIII) and secrets of astronomy (*Jyotiṣopaniṣad*, Ch.XV), and by not being based on a *Siddhānta*.

Although the traditional number of the allegedly revealed or semi-revealed *Siddhāntas* is stated to be eighteen,¹² only five of them were known to our author, viz., 1. *Pauliśa*, 2. *Romaka*, 3. *Vāsiṣṭha*, 4. *Saura* and 5. *Paitāmaha*.¹³ Of these, the first two were commented upon by *Lāṭadeva*,¹⁴ one of the direct pupils of *Āryabhata*.¹⁵ Our author declares that the *Siddhānta* composed by *Pauliśa* is accurate, that proclaimed by *Romaka* is close to it (in accuracy), and still more accurate is the *Sāvitra* (*Saura*) *Siddhānta*, while the remaining two, i.e., *Vāsiṣṭha* and *Paitāmaha*, are far from the truth.¹⁶ He allots varying amount of space to individual *Siddhāntas* in accordance with his assessment of their relative value. These *Siddhāntas* represent different stages in the evolution of Hindu astronomical systems. The *Paitāmaha* as known to *Varahāmiḥira* is very close to the *Vedāṅga Jyotiṣa*, the earliest astronomical work that India has bequeathed to us, and represents amorphous state of Indian astronomy. The *Vāsiṣṭha Siddhānta* is evidently comparatively more advanced and forms a transitional phase between

the earlier quasi-scientific astronomical works and the later perfected astronomical systems. The *Paulīśa* and *Romaka* are most probably responsible for introducing Greek astronomy in India. The *Saura* is the most perfect record of the early Indian scientific astronomy.

The Siddhāntas are said to incorporate the treatment of the divisions of the ecliptic and of time in terms of ages (*yuga*), years, half-years (*ayana*), seasons, months, fortnights, days (*ahorātra*) watches (*yāma*), hours (*muhūrta*), *nāḍī*, *prāṇa*, *truṭi*, subdivisions of *truṭi*, etc., the four kinds of time-measure—solar, civil, stellar and lunar, intercalary months and subtractive days; the beginning and end of the Jovian cycle of sixty years, of the lustrums, years, days, hours (*horā*), and their respective lords; similarity or difference, adaptation to use or not of the different reckonings of time, viz., solar, civil, stellar and lunar; the use of shadow and clepsydra, observation and calculation to find out the moment when the sun reaches the solstitial point and the time of the sun's entrance in the prime vertical; the cause of the swift and slow motion, the northern and southern course, and the moving in an epicycle of the sun and other planets; the method of predicting the moment of the commencement and cessation, the direction, magnitude, duration, amount of obscuration, colour and place of visibility of solar and lunar eclipses as also planetary conjunctions and hostile encounters; ascertainment of the distance in terms of *yojanas* of each planet from the earth, the dimension of their orbits, and the distance of the places on earth also expressed in *yojanas*; geometrical operations and calculation of time in order to determine the form of the earth, the circuit of the circle of asterisms, etc; the depression of the pole, the diameter of the day-circle, the ascensional differences in time, the rising of zodiacal signs, the *nāḍis* corresponding to the shadow of the gnomon, etc.¹⁷

Next comes horoscopy. It includes the following topics: the strength or weakness of zodiacal signs (*rāśi*), half signs (*horā*), third parts (*dreṣkāṇa*), ninth parts (*navāmśaka*), twelfth parts and degrees; determination of various kinds of power of the seven planets due to the direction, the place occupied, the moment and the contention; the temperaments (*prakṛti*), bodily elements (*dhātu*), substances (*dravya*), caste (*jāli*), and sphere of activity, etc. belonging to the department of each planet; conception, time of birth, prognostication of prodigious accessories, instant death of the child, span of life, destiny and intervening changes of it, the most favourable combinations of planetary positions as may exist in theory (*aṣṭakavarga*), the constellations in which kings are born (*rājayoga*),

the lunar constellations (*candrayoga*), the constellations formed by only two planets and so on, the celestial constellations, etc. and the effects of all these; descent and character, the planetary aspects (*avalokana*), manner of death (*niryāṇa-gati*), state in a former birth and after death (*anūka*), good and bad symptoms at the time of queries, the calculations of lucky periods for nuptial and other ceremonies.¹⁸

At present, Varāhamihira's are the earliest available works on Jātaka and Vivāha, both coming within the jurisdiction of Horā. But abounding references in his works to older authors whom he consulted indicate the existence in his time a large number of works dealing with these topics.

According to Utpala, the determination by means of *lagna* and planetary positions of auspicious or inauspicious fruits resulting from the consecration, travelling, marriage and such like matters is the function of Horā;¹⁹ but this definition does not appear to have been in common acceptance at the time of our author, for while incorporating Vivāha in the constants of Horā-śāstra he enumerates the contents of the Yātrā separately. It may be suggested that the Yātrā fell within the dominion of the Saṁhitā. In support of our view, we may point out that certain topics, e.g., foretokens of fire, prognostics from horses and elephants, bath for victory and *śākuna*, are common to both the Yātrā and Saṁhitā and consecration (*pratiṣṭhā*) is included in the latter.

The contents of the Yātrā are as follows: auspicious or inauspicious dates (*tithi*), week-days, *karaṇas*, asterisms, *muhūrtas* (48 minute periods), horoscopes, constellations, throbbing of the limbs, dreams, bath for victory, sacrifice to the planets, offerings to the goblins (*gaṇayāga*), foretokens of fire (*agnilakṣaṇa*), gestures of elephants and horses, the talk and acts of the troops, the pursuance of any one of the six-fold statecraft (*ṣāḍguṇya*) in conformity with the forebodings of the planets, good and bad auguries, the camping ground for army, the colour of the fire, the use, according to circumstances, of ministers, spies, messengers, and forest people (*āṭavika*) and the expedients for capturing enemy's strongholds.²⁰

Varāhamihira does not claim for himself the credit of prescribing the above contents of the Yātrā; on the contrary, he frankly confesses that they were laid down by the *ācāryas*, i.e., learned authors of Yātrā works (*ity=uktam=acāryaiḥ*), and in LXXXV.3 he refers to Garga and other Yātrā-writers and to works in

Sanskrit and Prakrit.²¹ The *Bṛhadyātrā* abounds in references to earlier authorities.²² The combined evidence of all these references proves beyond doubt the existence of a large number of works dealing with the prognostics for travels.

Natural astrology known as *Samhitā*, *Śakhā*, *Aṅga* or *Phalagrantha* treats of the following matters: the course of the sun and other planets and, during it, their natural and unnatural symptoms, magnitude, colour, brilliance of the rays, appearance, risings and settings, their routes and deviations therefrom, retrograde and post-retrograde motions, the conjunctions of planets with asterisms, etc. as also their consequences; the division of asterisms into nine triads and assigning different countries to them; the course of Canopus and of the Great Bear, assigning things, countries, and peoples to different planets and asterisms, the conjunction of the five planets in the figure of a triangle (*graha-śṛṅgātaka*), planetary conflicts, the conjunction of planets with the moon, the effects produced by planets on the years presided over by them, the symptoms of pregnancy of clouds, the moon's conjunction with Rohiṇī, Svāti, Pūrvāṣāḍhā and Uttarāṣāḍhā, the foretokens of immediate rain, prognostics from the growth of flowers and creepers, the mock sun, the halo, the line of clouds piercing the sun's disc at sunrise or sunset, the wind, the meteors, burning of quarters (*digdāha*), the earthquake, the glowing red of twilight (*sandhyārāga*), city-like appearance of clouds (*gandharvanagara*), haze, hurricane (*nirghāta*), fluctuation of prices (*arghakāṇḍa*) in accordance with the sun's movement in various signs of the zodiac, prognostics for the growth of crops (*sasyajanma*), Indra's banner, the rainbow, residential architecture (*vāstuvidyā*), palmistry (*aṅgavidyā*), auguries from crows (*vāyasa-vidyā*), the augural circle (*antaracakra*), the circle of wild beasts (*mṛgacakra*), the circle of dogs (*śvacakra*), the circle of winds (*vātacakrā*), temple-architecture, iconometry and iconography (*pratimā-lakṣaṇa*), installation of images (*pratiṣṭhāpana*), horticulture (*vṛkṣāyurveda*), exploration of sub-soil water-veins (*udagārgala*), the lustration (*nīrājana*), the signs of and omens from wagtails, allaying the influence of portents (*Butpāta-śānti*), miscellaneous matters (*mayūra-citraka*), the signs of swords, of tiaras, of cocks, of tortoises, of cows, of goats, of horses, of elephants, and of men and women; reflections on the harem (*antaḥpura-cintā*, including appreciation of women's virtues—LXXIII, winning the affection—LXXIV, erotic remedies—LXXV, cosmetics and perfumery—LXXVI, and the union of man and woman—LXXVII), the prognostics of boils, slits of shoes and garments, prognostics of chowries, of umbrella-sticks, of bed-steads and seats,

examination of jewels, omens from lamps, tooth-sticks, etc. occurring in the life of a common man as also kings.²³

The contents of the *Samhitā* were divided into two classes: *aṅga* and *upāṅga* (Cf. II.6, where the word *aṅgopāṅga* occurs). According to Garga, as cited by the commentator (on II.6), that which is based on planets, asterisms and twelve signs of the zodiac is called *aṅga* and everything else *upāṅga*.²⁴ Thus the sections on fauna, signs of men and women, slits of clothes and shoes, reflections on womankind, examination of jewels, signs of lamps, tooth-sticks, tiaras, swords, chowries, umbrellas, couches and seats, etc. which are of greater value for cultural history, come under the category of minor subjects, i.e., *upāṅgas*.

It seems likely that our author was responsible for extending the scope of the *Samhitā* so as to cover a somewhat wider field. To illustrate it, the whole section concerning the harem (*antaḥpuracintā*) covering Chs. LXXIII-LXXVIII is for the first time brought to bear on the contents of the *Samhitā* by our author. It is noteworthy that on none of the verses of these chapters except a few verses dealing with the signs of loving and disaffected women (LXXVII.4—11 where Kāśyapa is cited) does Utpala quote from earlier *Samhitās*. Āyurvedic works must have been the source of this new material. The *Kāmasūtra* of Vātsyāyana, the *Purāṇas* and the *Smṛti* literature also cannot be ignored in this connection. Ch. LXXVIII on couches and seats is evidently based on earlier *Vāstusāstra* works of Viśvakarman and others and not on the *Samhitās* of Garga, Kāśyapa, etc. Varahāmihira was the first to incorporate the sections on the examination of jewels (Chs. LXXIX-LXXXII), and the signs of lamps and tooth-sticks (Chs. LXXXIII, LXXXIV) in the *Samhitā*. On none of these topics does the commentator quote from any of the older *Samhitās*. Thus the major portion of what is called *upāṅga* of a *Samhitā* is an innovation of Varahāmihira and he may well lay a claim to originality in this respect.

Some verses of the *Bṛhatsamhitā* and Bhaṭṭotpala's commentary thereon enable us to form a rough idea of the nature and contents of the older *Samhitās*. 'Simply because a particular ancient work is', says our author, 'composed by a sage, it should be good, while that written by a human author of our time could not be so; this being a non-Vedic science why should there be any distinction between the two only because of difference in words, while the sense conveyed in both the cases is the same?'²⁵ In the next verse he mentions an instance of one and

the same statement being made in different words in a work attributed to Pitāmaha on the one hand and in that of human authorship on the other and asks the reader to see if there is any material difference between the two (I.4). That Varahāmiḥira had to defend himself indicates the presence of astrological works attributed to divine or legendary personages and an unwillingness on the part of the people to grant recognition to new works of human authorship.

In ancient India, it was customary for human authors in all the branches of study not to lay any claim to originality and to treat their own works as merely abridged versions or restatements of old writings and astrology was no exception. Varahāmiḥira, accordingly, tells us that the voluminous works emanated from Brahmā and others were undergoing a gradual process of being epitomised.²⁶ The work ascribed to Prathama Muni or Pitāmaha is styled *grantha-vistara* or an extensive treatise in 1.2, 5 and its redundant character is illustrated in I.4.

We may have some idea of the legendary character of the matters contained in earlier works of this class from I.11. We are promised that Varahāmiḥira would pass over queries and their answers, stories and the origin of planets, etc., which have no place in a science.²⁷ While illustrating these points, Utpala quotes extensively from Garga and Parāśara the legends and myths purporting to explain the origin of planets, etc. In Ch. V on the course of Rāhu, we are informed of the beliefs current about solar and lunar eclipses and Utpala quotes the authors responsible for the same. The unscientific and legendary character of older writings is also obvious from the fact that in a number of places where Varahāmiḥira's statements are at variance with the canons of mathematical astronomy, Utpala observes that they are based on earlier works (*pūrvāśāstras*). To give only a few instances, V.25²⁸ states that the author has in the preceding stanza (V.24) described the fruits resulting from the occurrence of the solar and lunar eclipse before or after the calculated moment only because they were to be found in the *pūrvāśāstras* and that the time fixed by an expert astronomer can by no means be wrong. Utpala quotes Garga and Kāśyapa as declaring the effects of such eclipses. In V. 84-85 are mentioned the results accruing from an eclipse ending on the southern or northern side of the moon's orb, and Utpala states that this is opposed to the rules of mathematical astronomy and that Varahāmiḥira is here merely reproducing the views of earlier writers²⁹ and then quotes Kāśyapa. Similar remarks are made by the commentator on V.89-90 which describe the results of the cessations of eclipses called *Madhyavidaraṇa* and

Antyavidaraṇa.³⁰ VI.1 states that if Mars should begin its retrograde motion in the ninth, eighth or seventh constellation reckoned from the asterism in which he is posited at the time of his emergence after the last conjunction with the sun, it is named Uṣṇavaktra, and according to Utpala even this statement is based on the *pūrvasāstras*³¹ and he actually quotes Vṛddha-Garga and Kāśyapa as holding such a view. It is said in VII.2 that when Mercury transits through Śravaṇa, Dhaniṣṭhā, Rohiṇī, Mṛgaśiras and Uttarāṣādhā cutting through any one of them, it leads to the absence of rain and outbreak of diseases³² and the commentator would have us believe that this statement is made by Varāhamihira following earlier works³³ and he cites a verse from Kāśyapa to that effect. VII.8-13 name and define seven courses of Mercury, namely, Prākṛta, Vimiśra, Saṅkṣipta, Tikṣṇa, Yogānta, Ghora, and Pāpa, and give measures in days for the rising and setting of Mercury in its seven courses. Utpala in this case makes the important statement that these do not agree with mathematical calculations, that Varāhamihira does not concur in this view, and that he merely restates here the views of earlier authorities such as Parāśara, Vṛddha-Garga and Kāśyapa³⁴ from whom he actually quotes passages. On IX.4 dealing with the paths (*vīthi*) of the course of Venus, Utpala adduces as authority verses from Garga and a prose-passage from Parāśara and explicitly states that in this case Varāhamihira differed from them. The statement that the Canopus (Agastya) rises and sets when the sun is posited in the asterisms Hasta and Rohiṇī respectively³⁵ is also regarded by the scholiast as inaccurate and based on earlier writings and not as Varāhamihira's own opinion.³⁶ XXXII.1-7 acquaint us with the prevalent beliefs as to the causes of an earthquake,³⁷ and Utpala represents Kāśyapa, Garga, Vasiṣṭha, Vṛddha-Garga, Parāśara and others as holding such views.

This brief survey leaves no room for doubt that our author improved upon the older Saṁhitās by bringing in much new material and leaving out of account certain legendary and unscientific topics.

The Question of Greek Influence

A passing reference may now be made to the much discussed question of foreign, particularly Greek, influence on Indian astronomy and astrology. Three of the Siddhāntas mentioned above betray very close acquaintance with Greek astronomy. The *Romaka* and *Pauliśa* bear non-Indian names. About astrology, Varāhamihira says, 'Yavanas are Mlecchas; this science (*Jyotiṣa*) is well-estab-

lished among them; (therefore) even they are worshipped like sages; how much more then would a twice-born proficient in astrology be?'³⁸ Moreover, Varāhamihira uses as many as thirty-four Sanskritised Greek words³⁹ and among his authorities on Jātaka is one Yavana (*BJ*, VII.1: XI.1; XXI.3; XXVII. 19-21). In some cases the name Yavana occurs in plural, indicating that the references are not to a Yavana author but to Greek authors in general or a school of the Yavanas. The name *Romaka* and the alleged identity of Puliśa, the supposed author of the *Pauliśa*, Maya (the modern *Sūryasiddhānta* is believed to have been revealed to him) and Maṇittha (*ibid.*, VII.1; *BY*, X.21; XI.9) with Polus Alexandrinus,⁴⁰ Ptolemy, the author of the astrological treatise *Almagest*⁴¹ and Manetho, the author of the *Apotelesmata*,⁴² respectively are also indicative of Indians' deep knowledge of Greek astronomy and astrology. Regarding the extent of the Greek impact, however, widely divergent views are held by competent authorities.⁴³ In our humble opinion, the *Romaka* and *Pauliśa* are direct Sanskritised importations from the West, while the evidences set forth above merely indicate Indians' acquaintance with Greek astronomy and astrology and at best an exchange between the two.

In recent years some concrete evidence of Indians' contact with the Greeks in the field of astrology has been brought to light. The *Yavana-jātaka* of Sphujidhvaja, clearly a Greek, composed in Śaka 191 has been published by David Pingree.⁴⁴ Another Sanskrit text on horoscopy called *Vṛddha-Yavana-jātaka* composed by one Minarāja in Western India in about the fourth century AD has also been critically edited and published by him.⁴⁵ Both these texts are said to be Sanskrit renderings of the original Greek texts, and this shows how the Graeco-Roman astrologers and astronomers had mastered the Sanskrit language and were able to transmit their astrological and astronomical knowledge to the Indians through their own language. There is no doubt that there must have been many more similar works that still await a searching eye.

Next, we shall mention, in an alphabetical order, the names of authors and works referred to in the *Bṛhatsamhitā* and append what little information we have been able to gather from various sources.

Earlier Writers and Works

1. *Atri*. Ch. XLV on *utpātas* is said to be a summary of the portentous phenomena which Garga expounded following Atri.⁴⁶ This admits of two inferences: that Atri wrote a work on *utpātas* which was followed as an authority by

Garga, or that Garga received instructions from Atri. He is also mentioned as an authority on Yātrā (BY, XXIX.3)

2. *Asita*. XI.1 names him as a writer on *Ketucāra*.⁴⁷ According to the commentator (on XXI.2), Asita also wrote on the pregnancy of clouds (*garbha-lakṣaṇa*). In BY, XIX.1⁴⁸ he is referred to along with Devala and Kāśyapa in connection with the signs of fire.

3. *Bādarāyaṇa*. XXXIX.1 tells us that the good and bad *yogas* for the growth of summer and autumnal crops at the time of the sun's entry into Scorpion (Vrścika) and Taurus (Vṛṣa) are narrated on the authority of Bādarāyaṇa⁴⁹ and Utpala cites from him one verse each on XXXIX. 2, 4, 8 10 and 12. Utpala (on XXI.2) again informs us that Bādarāyaṇa was an authority on *garbha-lakṣaṇa*. Bādarāyaṇa is quoted several times by Utpala in his commentary on YY, IV and BJ, VI.2 and XI.⁵⁰

4. *Baladeva*. LIII.125 states that Varāhamihira consulted the views of Baladeva and others regarding rainfall.⁵¹ This verse is not found in S. Dvivedi's edition.

5. *Bhāguri*. From XLVII.2, it appears that Bhāguri learned Puṣya-śānti from Vṛddha-Garga.⁵² In LXXXV.1, he is referred to as an author on Śākuna and Ṛsabha is said to have based his work on him along with others. He is also named in VP, verse 23.

6. *Bhāradvāja* LXXXV.2 mentions him as an ancient author on Śākuna and *Mahārājadhīrāja* Dravyavardhana, king of Avanti, is said to have based his treatise exclusively on that of Bhāradvāja. The commentator (on LII.75-76) quotes an Anuṣṭubh verse from him regarding the position of the door in a house.

7. *Bhṛgu*. According to LXXXV.43, *Bhṛgu* declared as auspicious the movement of the bird *cāṣa* and mongoose from right to left of a traveller in the afternoon.⁵³ Also mentioned in BY, IV. 30; XXIII.39.

8. *Bṛhadratha*. LX.1 states that the chapter on *golakṣaṇa* (signs of cows) is summarised from what Parāśara taught to Bṛhadratha (*Parāśaraḥ prāha Bṛhadrathāya go-lakṣaṇam yat kriyate tato=yam Mayā samāsaḥ śubha-lakṣaṇās=tāh sarvās=tath-āpy=āgamato=bhidhāsyē*).

9. *Bṛhaspati*. In XXIV.2, Bṛhaspati is said to have taught the moon's conjunction with *Rohiṇī* and its bearing on rainfall and crops to Nārada. According to LXXXV.1, Ṛsabha based his treatise dealing with Śākunas on Vāgīśa (Bṛhaspati)

along with others. In all, Utpala quotes five Anuṣṭubh verses from him: one Anuṣṭubh quoted on XXXV.3 deals with the signs of rainbow, another on LII.88 describes the places where a residential building should not be located, and three verses quoted on LII.2-3 treat of Vāstu-puruṣa.

10. *Devala*. It is stated in VII.15 that according to Devala the effects of Ṛjvī, Ativakrā, Vakrā and Vikalā motions of Mercury last for 30, 24, 12 and 6 days respectively⁵⁴ and Utpala (on VII.16) actually quotes five Anuṣṭubh stanzas from him. XI.1 names him as an author on *śikhiṭāra*. Along with others, his work on Śākuna is said to have formed basis of Ṛṣabha's work on the same subject (LXXXV.1). Utpala (on V.3) ascribes to Devala the view that Rāhu is formless and of the nature of pure darkness, and quotes an Anuṣṭubh of his to that effect. Devala is quoted by Utpala in connection with the course of Venus (one verse on IX.1) and Saturn (X.19, one verse), *grahavarṣa-phala* (XIX.22, one verse), *sandhyā-lakṣaṇa* (XXX.32, 1 ½ verses), and rainfall (XXI.2, XXIII.4, one verse). Thus the contents of Devala's work were similar to those of *BS*, and probably Devala was a Samhitā-writer. He is also mentioned in *BY*, XII.15 (on marching in different planetary aspects), XIX.1 (*agni-lakṣaṇa*); *YY*, IX.12 and *VP*, verse 22 (on the consequence of *nakṣatra* in regard to the nuptial). The reference to Devala in a verse of Ṛṣiputra quoted by Utpala on *YY*, I.15-16 shows that Devala was an older authority than Ṛṣiputra.

11. *Dravyavardhana*. It is stated in LXXXV.2 that on Śākuna Varāhamihira consulted, among others, the work which Mahārājādhirājaka Dravyavardhana, king of Avanti, had composed after consulting Bhāradvāja's work.⁵⁵ Now, Avanti stands for both western Malwa and its ancient metropolis Ujjayinī. However, the commentator takes it in the latter sense.⁵⁶ As Varāhamihira flourished about the middle of the sixth century AD, king Dravyavardhana, whose work he consulted, must have ruled some time before or around this date. The identity of this king and his relation with Ujjayinī have formed a subject of a long-drawn controversy between V.V. Mirashi and D.C. Sircar. According to Mirashi, Dravyavardhana was an Aulikara king who ruled from about V.552 to 572 (AD 495-515) and was thus a predecessor of Yaśodharman-Viṣṇuvardhana and probably his father. He takes the above statement of Varāhamihira to indicate that the Aulikara kings from Ādityavardhana onward ruled not from Daśapura (Mandasor), as usually believed, but from Ujjayinī⁵⁷. This view is disputed by Sircar who upholds the older theory taking Daśapura to be the capital of the Aulikaras.⁵⁸ It must be remembered

that Dravyavardhana is not mentioned in any epigraphic record, nor does Varāhamihira associate him with the Aulikaras. If, however, Dravyavardhana is assigned to the Aulikara family on some other grounds as is done by Mirashi, the gloss of Utpala would have us believe that Dravyavardhana, as also the family to which he belonged (i.e. Aulikara), had Ujjayini for the seat of his government. That Varāhamihira also uses Avanti in the sense of Ujjayinī would be evident from a comparison of XII.14⁵⁹ and its parallel in the *Samāsa-samhitā* quoted by the commentator.⁶⁰ In the latter 'Avanti' stands for 'Ujjayinī' used in the former. There is thus no room to doubt Dravyavardhana's association with Ujjain as his metropolis.

Recently discovered epigraphic evidence leaves no doubt that there is absolutely no room for Dravyavardhana in the imperial Aulikara line prior to Yaśodharman-Viṣṇuvardhana, and consequently he can be placed only after Yaśodharman-Viṣṇuvardhana whose successor he must have been. As we have shown elsewhere, he was the royal patron of Varāhamihira at the time of the composition of the *BS*.⁶¹

12. *Garga*. None of the authorities named in *BS* can claim a larger number of references than Garga. XI.1 refers to this *Śikhicāra*, and Utpala actually quotes a number of verses from him according to one of which (on XI.15) *ketus* number 1000. XX1.2 states that the account of the pregnancy of clouds is based, among others, on Garga. XXI.5 avers that the author will enumerate the days of the formation of rain-embryos following Garga and others. In contradistinction to Siddhasena he held that the formation of rain-foetuses commences on the first day of the bright fortnight of Mārgaśīrṣa (XXI.6). In XXIII.4, he is represented as holding the view that there will be good rain during the whole season if there be rain over an area of not less than 12 *yajanas* in the beginning. In XXIV. 2, he is said to have instructed his pupils about the moon's conjunction with Rohinī. According to XLV.1, Garga studied *utpātas* from Atri or was inspired by the latter's work. XLV. 52 informs us that the following two verses (XLV.53-4 describing a *śānti* to be performed when twins are born to a mare, she-camel, she-buffalo, cow or she-elephant) are composed by Garga, XLV.56-8, 79-80 refer to two other *śāntis* prescribed by Garga. XLVII.38-42 enumerate materials necessary for *Puṣya-snāna* following Garga's view. LV.31 refers to his *Prāsada-lakṣaṇa* (a work on temple architecture). XLIX. 15 tells us that the method of divining dents in a sword described in XLIX.11 ff. is based on Garga's view,

and Utpala actually quotes three Anuṣṭubh verses from Garga to that effect. According to LXIV.8, LXIV.9 describing four kinds of goats is of Garga. In LXXXV.3, Garga is represented as a writer on Yātrā and Śākuna. According to Utpala, II.1 and 6 are borrowed by our author from Garga. He is also named in BY, IV.6 (view about auspicious direction and *nakṣatras* for a royal march); VI.5, and in VP, 22-23. In the last verse, the name Garga occurs in plural number and may refer to a school of Garga's followers or may simply be indicative of honour. From what has been said above it would appear that most of the topics found in BS were dealt with in Garga's work which must come under the category of Samhitā, and it is interesting to note that most of the verses of Garga cited by the commentator (he quotes over 430 verses) can be traced to the extant *Gārgī Samhitā*.⁶² Garga appears to be a somewhat mythical personage, and according to Kern he is a meteoric phenomenon and his name originally denoted 'thunder, lightning', as a derivative from 'garja'.⁶³ In a few verses of Garga cited by Utpala on I.5, it is stated that Garga studied *Jyotiṣa Vedāṅga* from the Self-Born who created it for use in sacrifices and then from him (Garga) other sages received it and wrote works thereon.

Before proceeding to name other authorities, it would be desirable to record available information about Vṛddha-Garga also. XIII.2 declares that Varāhamihira would describe the motion of the constellation of the Great Bear (*saptarṣi*) relying upon Vṛddha-Garga's view, and the next verse is evidently based on Vṛddha-Garga whose verse is cited by the commentator. XLVII.2 states that Vṛddha-Garga imparted to Bhāguri the *śānti* which Svayambhū had expounded to the preceptor of gods for the sake of Indra. At a number of places, our author uses the words *muni* (Cf. XLVII.23, 51) and *ṛṣi* (Cf. LXXXV.6) and Utpala takes them to stand for Vṛddha-Garga. Utpala quotes over ninety-five verses from him. While illustrating *praśna* and *prati-praśna* in I.11, Utpala cites twenty-three verses in the Anuṣṭubh metre as Garga's (not twenty-five as stated by P.V. Kane⁶⁴), but in the verses themselves Vṛddha-Garga (not Garga) is introduced as propounder. In this case, Utpala seems to identify the two. At the same time, it is equally interesting to see Utpala quoting both Garga and Vṛddha-Garga separately on one and the same verse of BS. Thus on V.17, Utpala cites two stanzas in Anuṣṭubh from Vṛddha-Garga declaring that one should not predict an eclipse if on an *amāvāsyā* or *pūrṇimā* there be conjunction of five planets without Mercury, that the presence of the latter foreshadows an eclipse, and that the direction of the eclipse could

be pre-determined on the preceding *aṣṭami* by observing the appearance of a drop of oil poured on the surface of water. Then follow three verses of almost identical import quoted by Utpala as Garga's. V.17, however, dismisses it as irrational. In support of XI.7, Utpala quotes two verses each from Garga and Vṛddha-Garga as agreeing with each other, the second half of other second verse being literally identical. By way of supporting the latter half of XXXII.1 that the earthquake is caused by the heaving sighs of the elephants of the quarters tired with bearing the burden of the earth Utpala quotes 3½ as Garga's, while Vṛddha-Garga (2 verses on XXXII.2) is represented as holding the view that by means of earthquakes gods manifest their satisfaction or dissatisfaction with good or bad conduct of the mortals. These instances seemingly indicate some sort of distinction between the two. Kern, in order to get out of this ambiguity, suggests that 'Garga and Vṛddha-Garga considered as persons are one and the same; but when Utpala quotes Vṛddha-Garga, he has another work than the *Gārgī Samhitā* in view.' According to him the work cited as Vṛddha-Garga's either formed a kind of appendix to the *Gārgī Samhitā*, or both the works did not differ from each other more than different redactions of Sanskrit works are occasionally found to do.⁶⁵ P.V. Kane⁶⁶ is equally justified in concluding that Varāhamihira and Utpala had before them works ascribed to both Garga and Vṛddha-Garga and that they must have preceded Varāhamihira by some centuries. The fact of about 60 verses of Garga being quoted by Utpala in his gloss on *BJ* indicates, according to Kane, that Garga also wrote on *Horāśāstra*.⁶⁷

13. *Garutmān*. He is mentioned as one of the authorities whose views formed the basis of Ṛṣabha's work on *Śākuna* LXXXV.1).

14. *Kaṣṭhala*. A writer on *Śākuna* whose views were followed by Ṛṣabha (LXXXV.1)

15. *Kāśyapa* or *Kāśyapa*. In XXI.2, he is named along with Garga, Parāśara, Vajra and others as a writer on rainfall. XXIV.2 represents him as having taught the moon's conjunction with Rohinī to the assemblage of his pupils. In many verses, Varāhamihira uses words like 'anye' (XI.1), 'ādi' (XVII.3; XXI.5; LXXXV.3), 'kecit' (XXIII.4; XXXV.2) and 'eke' (XXXII.1; XLV.5; XCIV.62), and Utpala regards them as intended for Kāśyapa. The fact that Utpala quotes Kāśyapa (he quotes at least 255 verses as Kāśyapa's) on almost all topics contained in *BS* shows that the *Samhitā* attributed to Kāśyapa was a very extensive one.

16. *Manu*. XLII.39 refers to Manu in connection with making seven or five *Śakra-kumārīs* (decorative wooden dolls attached to the banner of Indra). XLII.51 prescribes that on the fourth day after the commencement of the festival of Indra's banner should be recited the *mantras* prescribed by Manu, and verses 52-55 are evidently quoted from him. It is declared in LIII.99 that our author has in the preceding verses treated of Dākargala on the basis of Sārasvata's work and that he would now proceed to deal with the same subject in Vṛtta metres following the work of Manu, and the commentator on LIII.102 actually cites five verses in Anuṣṭubh metre as Manu's on the art of tracing underground water. According to LIII. 110, the next following verse describing certain rocks and the results of their presence at a particular site is from a *muni*, probably Manu. LV.51 contains a reference to an extensive work on temple architecture by Manu.⁶⁸ On LXXXV.18, Utpala quotes what he styles as *manu-dharmāḥ* (one verse) about the relative strength of diurnal and nocturnal animals and birds in particular places. Of Manu as a Dharmaśāstra-writer, we shall say more subsequently. Now, as the topics in connection with which Manu is shown to have been referred to above come under the purview of a *Śamhitā*, his work must have belonged to that class. And Kern actually informs us that Manu is regarded as one of the eighteen *Samhitā*-proclaimers and is mentioned as an authority on astrology in the *Gārgī Samhitā*.⁶⁹ The fact that 'Utpala does not cite verses from Manu on topics like temple-architecture and Indra's banner has led Kane to conclude that 'Utpala had not before him the work of Manu on these topics, though Varāhamihira had it before him.'⁷⁰ The learned scholar seems to have overlooked the fact that all these topics form part of a *Samhitā* and they should not be looked upon as providing subject-matter for independent treatises. Now, Utpala actually cites as Manu's six verses in Anuṣṭubh metre, i.e. five on Dakārgala and one on Śākuna. No doubt whatsoever should, therefore, be entertained as to the presence of what may be called *Mānavī Samhitā* before Utpala when he wrote his gloss on *BS*.^{70a} Whether our Manu was identical with or distinct from the *dharmasāstra-kāra* of that name, is beyond one can say in the present state of our knowledge.

17. *Maya*. Maya is said to have imparted good and bad results of the moon's conjunction with Rohiṇī to his pupils' assemblage (XXIV.2). LV.29 and LVI.8 mention him in connection with architecture. He is also referred to in *BJ*, VII.1 regarding Āyurdāya. Thus Maya appears to have written a *Samhitā* and a *Horāśāstra*. Maya's work on architecture appears to have been independent of

his *Samhitā*. Being traditionally the architect of the demons, as Viśvakarman was of the gods, his name is associated with several treatises on *Vāstuvidyā*,⁷¹ mostly hailing from the south and belonging to a very late date. Now, as Utpala in his gloss on *BS* does not quote from Maya except regarding architecture, it may be conjectured that Maya's *Samhitā* was not available in his time, while Utpala's quotation from Maya on *BJ*, VII. 13 shows the presence of the latter's *Horāśāstra* in the former's time.

We learn from two verses in *Upajāti*⁷² quoted by Utpala on II.4 that Maya, the king of *Dānavas*, received the science from the Sun, sage *Vasiṣṭha* from *Viṣṇu*, and *Parāśara* from *Soma*, and they (Maya, *Vasiṣṭha* and *Parāśara*) diffused it among the *Yavanas*. This statement is in striking agreement with the *Sūrya-siddhānta* (XIV.22-27) according to which having studied this science from the Sun himself Maya bestowed it upon the sages who flocked round him. Since the name of the Egyptian sovereign *Ptolemios* occurs as *Turamaya* in *Aśoka's* inscriptions, *Weber*⁷³ suggests that this Asura Maya is identical with the *Ptolemios* of the Greeks, who wrote the *Almagest*, and this conjecture is strongly supported by *Whitney*.⁷⁴ This suggestion is not likely to receive general acceptance until some more reliable evidence comes forth. Whether this Maya is the same as or distinct from the writer of that name of an architectural treatise is difficult to decide. The latter view, however, seems to be the more likely one.

18. *Nārada*. As against some writers (e.g. *Parāśara*) holding the view that there are 101 *ketus* and others (e.g. *Garga*) believing in the existence of 1000 comets, *Nārada* is said to have opined that there is really only one *ketu* which appears in numerous shapes.⁷⁵ Utpala quotes a verse in *Anuṣṭubh* from him to that effect.⁷⁶ We are further informed that *Nārada* heard from *Bṛhaspati* the moon's conjunction with *Rohiṇī* and its effects on the top of the Mt. *Meru* (XXIV.2)⁷⁷ Whether the astrologer *Nārada* is the same as the legal writer of that name cannot be decided. *Weber's Catalogue of Mss. in Berlin Library* (No.862) mentions a *Nārada Samhitā*.

19. *Paitāmaha Siddhānta* (*BS*, II, p.22; *PS*, I.3). *Varāhamihira* informs us that by his time the *Paitāmaha Siddhānta* had grown inaccurate and very much mutilated as its calculations did not agree with the results arrived at by observation (*dṛkpratyaya*). This *Siddhānta*, as summarised by *Varāhamihira*, very closely followed in the footsteps of the *Jyotiṣa Vedāṅga*: it bases its calculations on the

system of luni-solar quinquennial *yuga* of five years⁷⁸ and fixes the winter solstice in the beginning of Dhaniṣṭhā.⁷⁹ In one respect, however, it shows a definite advance over the *Jyotiṣa Vedāṅga*. Whereas the *Jyotiṣa Vedāṅga* dealt with the calculations relating to the sun and moon only, it appears from Brahmagupta's *Brāhmasphuṭasiddhānta* (I.2) that the *Paitāmaha Siddhānta* contained calculations of the motion of other planets (*graha-gaṇita*) also. Its following the *Jyotiṣa Vedāṅga* and growing inaccurate in Varāhamihira's time show that it must have preceded him by some centuries. This conclusion seems to be supported on some independent grounds too. Āryabhata (born AD 476) holds Pitāmaha in high reverence and describes his own work as based on that of Svayambhū (Pitāmaha).⁸⁰ Brahmagupta (AD 628) also has probably the same *Paitāmaha Siddhānta* in view when he speaks of errors in calculations creeping into it due to lapse of a long time.⁸¹ Thus the *Paitāmaha* referred to by Āryabhata and Varāhamihira was extant in the seventh century AD when Brahmagupta composed his *Siddhānta*. It appears to have been lost and completely superseded by Brahmagupta's work some time before the ninth century AD, for Utpala quotes only from this latter work without caring to retain the word *sphuṭa*. Alberuni had naturally no knowledge of the older *Siddhānta* and he (I, 153-4.) invariably refers to the *Brāhma Siddhānta* as Brahmagupta's work. The old *Paitāmaha*, thus, seems to have been lost irrecoverably, its three modern versions being available at present, viz., Brahmagupta's *Siddhānta*, *Brāhmasiddhānta* forming a section of the *Viṣṇudharmottara*, and the one popularly known as *Śākalya Siddhānta*. The statement contained in I.4 that the day named after the earth's son (i.e. Mars) is not auspicious which is said to have been made in a work ascribed to Pitāmaha has led Kane to believe that the *Paitāmaha* incorporated certain astrological matters also. As against this, we may humbly point out that the reference in question seems to be to the *Samhitā* attributed to Pitāmaha or Brāhma and not to his *Siddhānta*. This suggestion of ours is borne out by the fact that Alberuni (I.157) mentions Brāhma (i.e. Pitāmaha) as a *Samhitā*-writer.

20. *Parāśara*. Traditionally the most ancient Hindu astronomer, Parāśara is referred to several times by our author. VII.8 mentions him as having declared seven kinds of motions of Mercury and names his work *Parāśara-tantra*.⁸² On III.1, 5; XXXII.26 also Utpala refers to the *Parāśara-tantra*. Varāhamihira (XI.1) tells us that before writing his chapter on *ketucāra* he consulted, among others, Parāśara's work on the same subject and Utpala would have us believe that Parāśara held the number of comets to be 101 (vide comm. on XI.5). On XI.36,

Utpala quotes a prose passage from Parāśara according to which the results of the appearance of Calaketu occur within 10 or 18 months. According to XVII.3, Parāśara held planetary conflicts to be of four kinds⁸³ and a prose passage of his quoted by Utpala names them as Bhedana, Ārohaṇa, Ullekhaṇa and Raśmi-saṁsarga.⁸⁴ XXI.2 refers to the *Garbhalakṣaṇa* (monsoonish indications) of Parāśara and XXIII.4 mentions him in connection with the predictions about rainfall. In XXIV.2, he is said to have imparted good and bad effects of the moon's conjunction with Rohiṇī to the multitude of his pupils. XXXII.3-7 refer to a myth about the cause of an earthquake and Utpala quotes a prose passage from Parāśara in support thereof. On XLIX.20, Utpala cites a prose passage as Parāśara's about the signs of swords. LX.1 states that our author will summarise the auspicious signs of cows which Parāśara imparted to Bṛhadārtha whose another name was, according to the commentator, Śārīgarava, and Utpala quotes in all fifteen verses of Parāśara on the same subject. LXXXV.3 mentions writings on Śākuna by Garga and other Yātrā-writers, and Utpala includes Parāśara among them. It will have become sufficiently clear from the above survey that Parāśara's work trod the same ground as *BS* and Alberuni (I, 157) actually refers to the *Samhitā* of Parāśara.

According to a verse quoted by Utpala on II.14, Parāśara studied Jyotiṣa from the moon (Soma) and spread it among the Yavanas. *BJ*, VII.1 calls him *Śaktipūrva*, i.e., one whose ancestor was Śakti. From Utpala's commentary on I.11 (pp.14-18); XXXII.II. 3-7 it appears that Parāśara's *Samhitā* contained some legendary matters, viz., stories about the war of gods and demons, origin of planets, etc. One of the most striking peculiarities of Parāśara's *Samhitā* is that it was composed in mixed prose and verse. Utpala profusely cites both prose passages and verses. For prose passage *vide* comm. on I.11 (pp.14-18); II (p.24); II.20; III.1, 24,32; IV.5; V.2, 16, 20-23, 32-34, 42, 52, 59, 60; VI.1, 2, 35; VII.9-13, 14; VIII. 2, 16, IX. 8, 22, 35, 36, 37-38, 39 etc. For verses *vide* comm. on III. 4, 5, 6 35, 36, 39; V. 63; VI.6, 7; VIII.18; IX. 36; X. 19,21 etc. Metrical part of Parāśara's *Samhitā* was mostly in Anuṣṭubh, though verses in Āryā and Upajati are also to be met with. From the occurrence of Āryās, Kern⁸⁵ concludes that Parāśara's *Samhitā* is of later origin than the *Gārgī Samhitā*.

Parāśara is also mentioned in *BJ*, VII.1; XII.2, and *VP*, 17,23. As we have seen above, Utpala includes Parāśara among the *yātrākāras*. He informs us that he had heard about Parāśara's works covering all the three branches of Jyotiṣa,

but that he had seen only his *Samihitā* and not *Jātaka* (on *BJ*, VII.9).⁸⁶ Two works on horoscopy entitled *Laghu-Pārāsarī* and *Brhat-Pārāsarī* are available now, but they do not appear to be genuine.

21. *Pauliśa Siddhānta* (BS, II, p.22). The *Pauliśa* is one of the earliest records of scientific Hindu astronomy, and Varāhamihira makes special mention of this *Siddhānta* for accuracy of calculations (*PS*, I.4). It was already commented upon by one Lāṭadeva (*PS*, I.3). In the original *Pauliśa Siddhānta* (the word original is prefixed to distinguish the *Pauliśa Siddhānta* abridged in *PS* from its later recasts) there are some indications of foreign derivation, e.g., it does not establish a general *yuga* of any kind, but operates with specially constructed short periods of time, and gives the difference in longitude between Banaras and Ujjain on the one hand and Yavanapura, probably identical with Alexandria, on the other (*PS*, III.13). The name *Pauliśa* has a non-Indian ring and suggests a foreign origin. And Alberuni (I, 153) actually states that it was composed by Puliśa and was so-called from Pauliśa the Greek who hailed from the city of Saintra which he supposed to be the same as Alexandria. The whole controversy centres round the identity of Pauliśa the Greek. Some propose to identify him with Paulus Alexandrinus, the author of the astrological treatise *Esiagoge* which has come down to us,⁸⁷ and regard the *Pauliśa Siddhānta* as a translation of that work. Weber holds that the *Esiagoge* was itself known to the Hindus in some form or other, for it alone contains nearly all the technical terms adopted by Indian astronomy from the Greek.⁸⁸ In support of his view, he points out that the *Esiagoge* contains a passage which is in almost literal agreement with one in the *Hāyana-ratna* of Balabhadra.⁸⁹ The untenability of Weber's opinion has been demonstrated by Kern who pointed out that the passage being a simple enumeration of lunar mansions and their lords is sure to be found almost literally in every work on nativity, that there is no indication of Balabhadra's borrowing this passage from Puliśa, and that the *Pauliśa* is a pronouncedly astronomical work, while the *Esiagoge* is, as confessed by Weber himself, concerned with astrology.⁹⁰

Like other *Siddhāntas*, the *Pauliśa* also seems to have undergone more than one recast. The *Siddhānta* from which Utpala quotes in all 23 *Āryās* under the names Puliśācārya, *Puliśa-siddhānta* and *Pauliśa* employs entirely different methods of calculation from those of the original *Pauliśa*. Thus while the original *Pauliśa* did not establish a constant *yuga* of any kind, its adoption in the later work of that name is evident from an *Āryā* quoted by Utpala on *BS*, II, p.23.⁹¹ Whereas

the duration of the year according to the original *Pauliśa* is 365d 15gh 30p, the year of its later version amounts to 365d 15gh, 31p 3v. Moreover, Utpala cites a verse in Anuṣṭubh from what he calls *Mūla-Puliśa-siddhānta* (BS, II, P.27). Even this *Mūla-Puliśa-siddhānta* is distinct from that compressed in PS. Thus, there appear to have been three different versions of the *Pauliśa*, (1) that abridged in PS, (2) the one from which Utpala quotes 23 Āryās, and (3) the *Mūla-Puliśa siddhānta* from which Utpala extracts a verse in Anuṣṭubh.⁹² Which of these *Pauliśas* was known to Alberuni is not possible to decide.

22. *Romaka Siddhānta* (BS, II, p.22) The original *Romaka* stood close to the *Pauliśa* with regard to the accuracy of calculations (PS, 1.4) and, like the latter, had already been commented upon by Lāṭadeva (PS, 1.3). Its name points to the West and indeed there is some unimpeachable internal evidence indicating its derivation from some foreign source. It calculates *ahargaṇa* for the meridian of Yavanapūra, i.e. Alexandria (PS, I.8). It adopts a luni-solar *yuga* of its own comprising 2850 years, 1050 intercalary months and 16547 omitted lunar days (*tithis*) and reducible by 150 (PS, I.15); it is based on the Metonic period consisting of 19 tropical years comprising 235 synodical months.⁹³ Again, the *Romaka* is the only *Siddhānta* to employ tropical revolutions of the sun and moon, while the *Sūryasiddhānta* treats of sidereal revolution only.

The *Romaka* epitomised in PS must be distinguished from the pseudo-*Romaka Siddhānta* now deposited in India Office Library, London. Brahmagupta states, "Having taken the rules regarding the mean motions of the sun and the moon, the moon's apogee and node, as also the mean motions of Mars, Mercury's *Śighra*, Jupiter, Venus's *Śighra* and Saturn from Lāṭa, elapsed years and revolutions of the *yuga* from the *Vāsiṣṭha*, *Pāda* from Vijayanandin's work, and rules about the apogees, nodes, epicycles and true motions of planets from Āryabhaṭa, Śrīṣeṇa transformed the *Romaka*, the mountain of jewels, into a tattered garment."⁹⁴ Thus Brahmagupta clearly distinguishes the original *Romaka Siddhānta* from its later version made by Śrīṣeṇa both of which were known to him. The extant *Romaka* seems to be the same as or based on Śrīṣeṇa's recension.

Now as regards the date of the original *Romaka Siddhānta*. The facts that the *Romaka* had already a commentary by Lāṭa, that both Varāhamihira and Brahmagupta are silent about the name of its author and treat it as of divine origin, that the length of the year of the original *Romaka* is the same as that of Hipparchus, i.e., 365d 14gh 48p, and that it contains calculations of only the

sun and the moon, and not of planets, tend to show that the work in question was composed sometime between BC 150, the date of Hipparchus, and AD 150, the date of Ptolemy, who first established the theory of the planets in accordance with the principles of Hipparchus.⁹⁵

23. *Ṛṣabha*. He is said to have consulted the views of Śakra, Śūkra, Bṛhaspati, Kapiṣṭhala, Garuṁmat, Bhāguri and Devala before composing his own work on Śākuna (LXXXV.1)⁹⁶

24. *Ṛṣiputra*. Our author names Ṛṣiputra expressly only once. XLV.82 states that the author will quote the verses composed by Ṛṣiputra describing the phenomena natural to different seasons which should not be looked upon as *utpātas* and indicate no evil effects.⁹⁷ Next twelve verses (XLV.83-94) appear to be citations from Ṛṣiputra, and it is noteworthy that all these verses are in Anuṣṭubh, the metre in which all the verses cited by Utpala as Ṛṣiputra's are composed. The information that Varāhamihira gives about Ṛṣiputra's work is meagre in the extreme; but the commentator quotes Ṛṣiputra in connection with *Rāhucāra* (V.27, 4 verses), the motion of Mercury (VII.15, 2 verses) and Venus (IX.36, 2 verses), Jovian year (VIII.1, 3 verses), planetary conflicts (XVII.2-3, 1 verse), the moon's conjunction with the planets (XVIII.1, verse), rainfall (XXI.30, 1½ verses), the moon's conjunction with Rohiṇi (XXIV.10, 3 verses), signs of rainbow (XXXV.3, 1 verse) and omens (LXXXV.15, a prose passage comprising 12 lines). It shows that like Parāśara's, Ṛṣiputra's work was composed in mixed prose and verse and dealt with contents similar to those of BS. Utpal quotes him profusely in his gloss on the *Yogayātrā* also.⁹⁸

25. *Śakra*. He is the first in the list of authors on Śākuna whose views were consulted by Ṛṣabha before he composed his own work on the same subject (LXXXV.1).

26. *Saptarṣi* (LXXXV.3). Varāhamihira is said to have consulted, among others, the view of the seven seers (Marīci etc. according to Utpala) also before composing his chapters on Śākuna.

27. *Sārasvata*. LIII.99 states that the preceding account of Dakārgala in Āryās is based on that of the sage Sārasvata and the commentator really quotes 31 verses in Anuṣṭubh from him. *Vide* Utpala on LIII.6-7 (3 verses), 9-10, (2), 16 (2), 17 (2), 21-22 (2), 24 (1), 29-30 (2½), 31-32 (2), 37 (1½), 58 (1), 63-64 (2), 67 (1½), 83 (2), 85 (2), 90 (1½), 95 (1½), 96 (1½). Sārasvata's work on Dakārgala seems to have been lost by the time of Alberuni (I.158) who mentions

him among the 'Hindu scholars of whom we know their names, but not the title of any book of theirs.'

28. *Saura Siddhānta* (BS, II, p.22) XVII.1 states that the author has already dealt with the means of predicting when and how a planetary conflict would occur in the *Sūrya-Siddhānta* section of his *Karaṇa*, i.e., PS.⁹⁹ Its calculations were more correct than even those of the *Pauliśa* and *Romaka* (PS, I.4). The great importance that Varāhamihira attaches to the *Sūryasiddhānta* is evident from the fact that while he gives the calculations of the sun and the moon separately in the case of each of the five Siddhāntas, calculations of planets are of the *Sūryasiddhānta* alone.

The *Saura* known to Varāhamihira must be distinguished from the extant work of that name. A comparison of certain astronomical calculations employed in the original *Sūrya-siddhānta* with those of its modern representative reveals a fundamental difference between the two works with regard to many details.¹⁰⁰ Alberuni (I.153) ascribes the *Sūryasiddhānta* to Lāṭa. But this statement cannot have reference to the old Siddhānta. Varāhamihira is fully aware of Lāṭa's commentaries on the *Pauliśa* and *Romaka* and probably an independent work also as appears from the manner in which he refers to Lāṭa's view to the effect that the *ahargaṇa* is to be reckoned from sunset at Yavanapura (*Lāṭācāryaen—okto Yavanapure=rddh-āstage sūrye*, PS, XV.18). This view is opposed to the *Sūryasiddhānta* according to which *dyugana* is counted from midnight. Moreover, had the original *Sūryasiddhānta* been Lāṭa's work, Varāhamihira would not have held it as of divine origin. Brahmagupta also draws distinction between the *Sūryasiddhānta* and Lāṭa. Lāṭa's hand may, however, be suspected in remodelling the original *Saura* and giving its present shape. Even if Lāṭa is responsible for the modern *Sūryasiddhānta*, his work was not known by that name at least until the ninth century AD as is clear from the fact that Utpala cites in his gloss on BS in all five verses from the *Sūryasiddhānta*¹⁰¹ which are not to be found in the extant *Sūryasiddhānta*. The modern *Sūryasiddhānta* had, however, earned its place of honour by the time of Bhāskarācārya who quotes in his own commentary on the *Siddhāntaśiromaṇi* two verses from the *Sūryasiddhānta* which are Spāṣṭādhikāra 1-2.

Next, as regards the date of the original *Sūryasiddhānta*. Bentley held that the modern *Sūryasiddhānta* dates from the eleventh century AD, or to be more exact, from AD 1091, and that there was no *Sūryasiddhānta* before that. His latter view has been successfully combated by Whitney (*Sūryasiddhānta* Tr., pp.21ff).

Both Varāhamihira and Brahmagupta regard it as of divine origin; this tends to indicate that the Siddhānta must have preceded them by a considerably long time. S.B. Dikshit thinks that the *Romaka* was composed by AD 150 at the latest and regards the *Saura* as anterior to it.¹⁰² While upholding Bentley's view regarding the lower limit of the date of the modern *Sūryasiddhānta*, P.C. Sengupta pushes back the upper limit of the original *Sūryasiddhānta* to AD 400, or rather 384,¹⁰³ when it came from the Asura or Babylonian source.¹⁰⁴

29. *Siddhasena*. According to XXI.5, some held that the days of pregnancy of clouds begin after full moon of the month of Kārttika, and the commentator would have us believe that the authority intended here is Siddhasena from whom he quotes one verse in Anuṣṭubh. He is mentioned in *BJ*, VII.7 in connection with āyurdāya.

30. *Śukra*, (LXXXV.1), a writer on Śākuna whose views were consulted by Ṛṣabha. XLIX.23-24 give a prescription of Uśanas for sharpening the blade of a sword. According to Utpala, Uśanas stands here for Śukra. *BS*, Ch. 49 including the prescription of Uśanas is reproduced verbatim in *YY*, XII. *YY*, XVII.1 states that the author would give in the following verses the *mantra* found in the *śāstra* of Uśanas for making umbrellas, banners and weapons specially fit for the destruction of an enemy.¹⁰⁵ In *YY*, V.3 is quoted Uśanas's view that a monarch desirous of victory should not undertake any march in Maghā or Svāti. Śukra or Uśanas is nowhere quoted by Utpala.

31. *Vajra*. Vajra is expressly referred to only once in *BS*. In XXI.2, it is declared that Varāhamihira consulted among others Vajra's work on monsoonish indications before writing his own section on the same subject. Utpala refers to him in connection with *ketucāra* (XI.1) and planetary conflicts (XVII.3) also but nowhere quotes from him.

32. *Vasiṣṭha*. XXII.4-8 dealing with the days of the retention of rain-foetuses appear to be Vasiṣṭha's if we are to rely on the wording of XXII.3 (*ślokaś=c-āpy=atra Vāsiṣṭhāh*). In XXIII.4, Vasiṣṭha along with Garga and Parāśra is represented as holding the view that if there is rain over an area of twelve *yojanas* in the beginning of the rainy season there would be good rain throughout that season. In LVII. 8, Vasiṣṭha is said to have opined that there should be a distance of four *aṅgulas* between the eye-ends and ear-holes of an image and Utpala quotes half an Anuṣṭubh as his to that effect. In several places of his gloss on *BS*, Utpala takes the words *muni* (XVIII.3, on four kinds of *grahayuddhas*; XXI.2, monsoonish

indications), *ādi* (XXI.5; LV.31, on temple-architecture; LXXXV.3, on Śākuna), *anye* (V.3; XXXII.2), etc. to stand for Vasiṣṭha and others.

He is also mentioned in *BY*, II.3 (next verse in Anuṣṭubh being his), VIII.6, IX.2, XI.9, and *BY*, XI.10-21 are quoted from him. Thus in addition to his *Samhitā*, which treated of topics similar to those of *BS*, Vasiṣṭha appears to have written a *Yātrā* also, both in Anuṣṭubh.

Utpala quotes two verses on II.14 according to which Vasiṣṭha received Jyotiṣa from Viṣṇu and spread it among the Yavanas. This statement is repeated in somewhat different words in *BY*, II.6 (*Aśrauṣic=ca purā Viṣṇor=jñān-ārtham samu-pasthitah Vacanam loka-nāthasya niḥsrtam mukha-pankajāt*).

Vasiṣṭha has a *Siddhānta* also attached to his name. Although evidently more advanced than the *Paitāmaha*, it was likewise far from being accurate (*PS*, I.3), and Varāhamihira accordingly devotes to it only a short chapter consisting of thirteen verses (Ch.2). The *Vāsiṣṭha Siddhānta*, as summarised by our author, gives calculations of the sun and the moon only and not of planets.

According to Alberuni (I.153), the *Vāsiṣṭha* was so called from one of the stars of the Great Bear and was composed by Viṣṇucandra. This statement is apparently based on Brahmagupta who informs us that Viṣṇucandra made a recast of the *Vāsiṣṭha* by incorporating in it certain elements from *Lāṭa*, (original) *Vāsiṣṭha*, Vijayanandin and Āryabhaṭa as was done by Śrīṣeṇa in the case of the *Romaka* (*Etāny=eva grhītvā Vāsiṣṭho Viṣṇucandrena, Brāhmasphuṭa-Siddhānta*, XI.50) Brahmagupta, thus, makes Viṣṇucandra responsible for a fresh redaction of the *Vāsiṣṭha* and not the original work of that name, which he clearly distinguishes from each other.¹⁰⁶ The extant *Vāsiṣṭha Siddhānta* seems to be based on Viṣṇucandra's work.

II

ARCHITECTURE AND SCULPTURE

In the opening verse of Ch. 52 of *BS*, it is stated that the knowledge of *Vāstuśāstra* had come to be transmitted through generations of sages (*Vāstu-jñānam=ath=ātaḥ Kamala-bhavān=muni-parampar-āyātam*, LII.1), and the concluding stanza of Ch. 55 speaks of extensive treatises on temple-architecture by Garga, Manu and others (*Prāsāda-lakṣaṇam-idaṁ=kathitaṁ samāsād=Gargena-yad=viracitaṁ*

tad=ih—asti-sarvam, Manu=ādibhir=viracitāni prthūni yāni tat saṁsprśan prati may-ātra kṛto=dhikārah, LV.31). In addition to Garga, Manu, Maya and Vasiṣṭha whose views have been noticed above, we have references to Nagnajit and Viśvakarman also.

Nagnajit. LVII.4 states that according to the Drāviḍa measure given by Nagnajit the length of the face of an image should be 14 *aṅgulas*, while in LVII.15 he is represented to have held that the length of the face including the line of the hair should be 16 *aṅgulas*. In both the cases, Utpala cites relevant verses from Nagnajit, and in his gloss on the last mentioned verse he refers to Nagnajit's *Pratimālakṣaṇa* (*Nagnajit-proktaṁ pratimālakṣaṇe āsyam mukham sakeśanicayam keśarekhayā sahitaṁ ṣoḍaś-aṅgulāni*). Elsewhere, he attributes two more works to Nagnajit, *Prāsādalakṣaṇa* (on LV.31) and *Citralakṣaṇa* (on XLV.23), the latter dealing, among other things, with various kinds of weapons. These three were probably independent works and not parts of a large compendium. A *Citralakṣaṇa*, also known as *Nagnajitcitralakṣaṇa* or *Nagnavṛata*, attributed to him, is available in its Tibetan version and has been edited by Laufer. But the Tibetan text does not deal with weapons. Hence either the Tibetan text is incomplete or it is erroneously ascribed to Nagnajit.¹⁰⁷

Viśvakarman. Viśvakarman is said to have held that the height of a storey (*bhūmikā*) should be 84 *aṅgulas* (3½ cubits), while the same according to Maya should be 108 *aṅgulas* (LV.29), indicating that they represented two different schools of architecture, northern and southern. At another place, Viśvakarman is represented to have opined that the breadth of a couch should be a half of its length less by an eighth (LXXVIII.10). In both these places, Utpala quotes verses in support of the above statements. Viśvakarman's name is associated with a large number of treatises on *Vāstuvidyā*,¹⁰⁸ but most of them appear to be very late compilations. It is held by some¹⁰⁹ that the *Viśvakarma-prakāśa* is a late compilation of a work of Viśvakarman, but earlier than *BS*. In our opinion, it is a very late unintelligent compilation by an incompetent hand. Long ago, Kern¹¹⁰ pointed out that *BS*, LII.30, 31 are also found in the *Viśvakarma-prakāśa*¹¹¹ and as these are the only stanzas in *Āryā* in the *Viśvakarma-prakāśa*, they must have been borrowed by the latter from *BS*. Many verses from *BS* are reproduced verbatim in the *Viśvakarma-prakāśa*, which seems to be later than even Utpala (9th Century AD), for while a few verses cited by him in the name of Viśvakarman (on *BS*, LII.76) may be traced in it (VII.78), there are others that are not found in it.¹¹²

III DANĀNĪTI

According to Utpala, II.4, viz., 'It is possible that one trying to cross the ocean may reach the other shore by means of favourable wind, but one who is not a sage cannot even mentally reach the end of Kālapuruṣa, i.e., astrology, which is like a great sea,' is borrowed by our author from Ācārya Viṣṇugupta.¹¹³ In *BJ*, VII.7, Varāhamihira is critical of the views of Viṣṇugupta, Devasvāmin and Siddhasena regarding *āyurdāya*¹¹⁴ and Utpala quotes an Anuṣṭubh from Viṣṇugupta which name he regards as synonymous with Cāṇakya (*Viṣṇuguptena Cāṇaky-āpara-nāmn—aivam—uktam*). *BJ*, XXI.3 represents Viṣṇugupta as criticising the views of Satya and Yavanas¹¹⁵, and on this Utpala quotes two Āryās in the names of Cāṇakya and Viṣṇugupta (*atra Viṣṇugupta-Cāṇakyāv-āhatuḥ*). But the incorrectness of this reading of the printed editions is pointed out by Kane¹¹⁶ who informs us that the reading in Mss. is '*Viṣṇuguptas=Cāṇakya āha*' which is the correct one. *BY*, XXII.4 names Viṣṇugupta in connection with the signs of horses¹¹⁷ and verses 5-11 appear to be cited from or based on Viṣṇugupta's work. Naturally these verses are not to be found in Kauṭilya's *Arthaśāstra* which is given to the condemnation of too much belief in astrology.¹¹⁸ It seems likely, as suggested by Kane,¹¹⁹ that there were really two Viṣṇuguptas, one the author of the *Arthaśāstra* and the other a writer of an astrological treatise and that Utpala who flourished long after them erroneously confounded the two.

But there are other indications that Varāhamihira knew Kauṭilya's *Arthaśāstra* full well. He expressly refers to some *Arthaśāstra* text in *YY*, I.7, XIII.4 and to those skilled in *Arthaśāstra* in XVI.23 (*arthaviduṣaḥ*) and Utpala understands it as the *Kauṭīliya* (*arthaśāstrāṇi Cāṇakya-prabhṛtīni*, on *YY*, I.7; *arthaśāstrāṇi Cāṇaky-ādīni*, on *YY*, XIII.4). Varāhamihira (LXXVII.1-2) advises men to examine carefully the attachment or otherwise of their wives towards them and in this connection gives two instances of faithless queens killing treacherously their royal consorts, Vidūratha and Kāśīrāja,¹²⁰ which are evidently borrowed from Kauṭilya who gives as many as seven such instances.^{120a} In *BY*, XXX.1-3 and XXXI.1-2 are described moral weaknesses of an assailable monarch. They seem to be based on the *Kauṭīliya* VI.1 (last passage), VII.4. In his commentary on *YY*, Utpala cites several passages from the *Kauṭīliya* in order to elucidate certain terms used by Varāhamihira.¹²¹ *BY*, XXI.7 states that while working in ivory one should leave

a length two times the periphery at the bottom of an elephant's tusk. It is literally identical with a similar stanza in the *Kauṭīliya*.¹²²

XIX.11 refers to the prosperous state that the four branches of knowledge, viz., Vārtā, Trayī, Daṇḍanīti and Ānvīkṣikī reach in the year of Mercury, and Manu's Daṇḍanīti is named in this connection.¹²³ In BS, Ch.73, Varāhamihira desperately defends women against the allegations levelled against them and LXXIII.7-11 are quotations from Manu if we are to rely on the wording of LXXIII.6 (*Manun ātra c-oktam*). But of these only LXXIII.10 is traceable to the extant *Manusmṛiti* (III.58). This indicates that the text of Manu which Varāhamihira had before him was different from the extant one. Manu along with Vyāsa is referred to in YY, XVI.4, in connection with the ethics of war and the following verses seem to be a summary of Manu, VII.87-94, 164-7, 170-71, 181-99.

IV

EROTICS

BS, Chs. 74, 75 and 77 deal with winning a lady's love (*subhagaṅkaraṇa*), erotic remedies (*kāṇḍarpika*) and union of man and woman (*pumstrīsamāyoga*) which really fall within the domain of Kāmasāstra. It will be seen from a comparison of these chapters with Vātsyāyana's *Kāmasūtra* that the latter is one of the sources of the former.¹²⁴ The erotic remedies described in Ch. 75 are very much similar to those prescribed in *Kāmasūtra*, VII.1 36-51. LXXVII.9-11 warn the reader against dangers to a woman's character which appear to be based on *Kāmasūtra* III.1.16, III.4, 10; III.4.33-34; III.5.9; IV.4; IV.1.9; V.5.11, etc. The signs of a loving woman described in LXXVII.4-6, 12, 15 will be found in somewhat different words in *Kāmasūtra* III.3. 24 ff.; IV.1. These similarities apart, verse 17 of the *Vivāhapaṭala* mentions one Vātsyā in connection with the proper year, month, fortnight, *tithi*, etc. of marriage. We cannot be sure about his identity with Vātsyāyana, the famous author of the *Kāmasūtra*.

V

PHILOSOPHY

BS, I.6-7 contain passing reference to various theories regarding the origin of the cosmos. I.6 tells us that originally there was darkness prevailing throughout the universe and from the primeval waters sprang a golden egg consisting of

two halves, the earth and the heaven, and that out of this arose the creator with the sun and moon as his eyes. This seems to be an abridged version of *Manu* I.5-13 which are quoted by the commentator. I.7 alludes to a number of philosophical speculations. Kapila is named and the Sāṅkhya theory of *pradhāna* or *prakṛti* being the material cause of the universe is referred to. It is most probably, Iśvarakṛṣṇa's *Sāṅkhyakārikā* that our author had in view, for the *Sāṅkhya sūtras* are placed by most scholars in the ninth century AD. Utpala actually quotes verses 22-30 of the *Sāṅkhya-kārikā* in support of Varāhamihira's statement. Now, as the readings of the verses quoted by him considerably differ from those of the printed editions, they may be of great value in bringing out a critical edition of the work. Next comes Kaṇabhuj (Kaṇāḍa), the founder of the Vaiśeṣika school, advocating the atomic theory and regarding the nine *dravyas* as the source of the universe. Next are mentioned the Paurāṇic, the Laukāyatika and the Mīmāṃsā theories of the time, innate nature (*svabhāva*) and action (*karman*) respectively being the cause of the universe. The commentator cites some passages which I am unable to locate.

VI RELIGION

A *Sāvitra-śāstra* dealing in detail with the procedure of the installation and consecration of the images of individual gods is referred to in LIX.22. We have no information whatsoever about the date or authorship of this work; but it must have been considerably older than Varāhamihira who regards it as a great authority. This is the oldest reference to a work dealing with this subject and its discovery is bound to be of great value for the religious history of India. While commenting on LIX.19, Utpala refers to a work called *Vātulantra* which dealt with the consecration and installation of Śiva's images.

VII PALMISTRY

According to LXVII.1, an astrologer desirous to attain the power to reveal one's past and future by observing one's physical appearance must be well-versed in the *Sāmudra*. Utpala treats *Sāmudra*¹²⁵ as the name of a work on palmistry and cites in all 20½ verses in Anuṣṭubh from that work. *Vide com.* on LXVII.3

(2 verses), 4(1), 6(2), 8(4), 9(1½); LXIX.2-3(6), 6(1), 10(3). No information about the authorship of this work is available. Its discovery will throw welcome light on the history of palmistry in India.

VIII METRICS

Our author was a skilled versifier. He uses not less than 63 different metres in *BS* alone, Āryā being the most favourite one. In this respect no writer chronologically anterior to him can stand a comparison. Strenzl has analysed and listed them.¹²⁶ Ch. CIII of *BS* dealing with the results of the various planetary positions in one's horoscope is couched in different metres, each stanza naming the metre it illustrates. The metres thus mentioned are listed below, the serial number of verses in which they occur being given in brackets:

Mukhacapalā (2), Jaghanacapalā (3), Śārdūlavikrīḍita (4), Sragharā (5), Suvadanā (6), Suvṛttā (7), Śikhariṇī (8), Mandākrāntā (9), Vṛṣabhacarita (10), Upendravajrā (11), Upajāti (12), Prasabha (13), Mālāti (14), Aparavaktra (15), Vilambitagati (16), Supuṣpītāgra (17), Indravamśā (18), Svāgatā (19), Drutapaḍa (20), Rucirā (21), Praharṣaṇīya (22), Dothaka (23), Mālinī (24), Bhramaravilasita (25), Mattamayūra (26), Maṇiguṇaṇikara (27), Hariṇapluta (28), Lalitapada (29), Śālinī (30), Rathoddhatā (31), Vilāsinī (32), Vasantatilakā (33), Indravajrā (34), Anavasitā (35), Lakṣmī (36), Pramitākṣarā (37), Sthira (38), Toṭaka (39), Vamśapatrapatita (40), Lalita (41), Bhujaṅgaprayāta (42), Puṭā (43), Vaiśvadevī (44), Ūrmimālā (45), Vitāna (46), Bhujaṇavijrmbhita (47), Udgatā (48), Gityāryā (49), Upagīti (50), Āryā (51), Narkuṭaka (52), Vilāsa (53), Āryāgīti (54), Pathyāryā (55), Vaktra (56), Śloka (57), Anuṣṭubh (58), Vaitāliya (59), Aupacchandāsika (60), Vṛṣṭiprayāta-daṇḍaka (61), Varṇakadaṇḍaka (62), Samudra-daṇḍaka (63), Vipulā Āryā (64.)

CIII.52 equates Narkuṭaka and Gitaka and Utpala tells us that what is Narkuṭaka in Sanskrit is Gitaka in Prakrit (*Gītakam Prākṛte, Narkuṭakam Saṁskṛte, tau ca tulya-prastārau tulya-virāmāu=eva bhavataḥ*). Similarly, CIII.54 equates Āryāgīti (Sanskrit) and Skandhaka (Prakrit), Vaitāliya and Māgadhi, and Āryā and Gāthā. Though all the metres thus named are not defined, peculiar features of some of them are occasionally referred to: the number of groups (*gaṇas*) of *mātrās* is the same in both the halves of Upagīti (Upagīter=*mātrāṇām gaṇavat*, CIII.50); in Āryā there ought not to be a *jagana* in the odd groups, while the

sixth group ought to have a *jagaṇa* or four short syllables;¹²⁷ in the Śloka the 5th syllable in all the quarters, and the 7th in the 2nd and 4th ought to be short;¹²⁸ a short syllable at the end of a line is treated as long.¹²⁹

In the concluding verse of this chapter (CIII.64), Varāhamihira refers to copious works on metrics, but tells us that the metres enumerated and illustrated in the preceding stanzas ordinarily suffice for all practical purposes, and hence he collected together the metres pleasant to hear.¹³⁰ In CIII.3 Māṇḍavya is referred to as a writer of a work on metrics and Utpala adds the name of Rāja (perhaps a mistake for Rāta). Both these authors were older than even Piṅgala who mentions them.¹³¹ They appear to have been joint authors of a work, for Utpala (on CIII.61) assigns a common verse to both of them.¹³² Their work is no more extant.

We know hardly anything about the source from which Varāhamihira derived his information about metrics. Nor does Utpala enlighten us on the point. It has been suggested by H.D. Velankar¹³³ that Varāhamihira probably followed the *Chandaḥśāstra* of Jayadeva, for the name Narukūṭaka, which is used in CIII.52, was, according to Hemacandra's *Chandonuśāsana*, first given to that metre by Jayadeva. But it does not seem to be very likely for, as pointed out by the learned authority himself, fourteen of the metres mentioned and illustrated by our author are not known to Jayadeva, and also because the date of Jayadeva is not quite certain.

The above survey will have made it sufficiently clear that vast literature on various subjects flourished at the time of our author. Most of the works referred to above are lost and the value of these references can hardly be overestimated.

Notes and References

1. ज्यौतिषमागमशास्त्रं विप्रतिपत्तौ न योग्यमस्माकम्।
स्वयमेव विकल्पयितुं किन्तु बहूनां मतं वक्ष्ये॥
IX.7.
2. ज्योतिःशास्त्रमनेकभेदविषयं स्कन्धत्रयाधिष्ठितं
तत्कात्स्न्योपनयस्य नाम मुनिभिः संकीर्त्यते संहिता।
स्कन्धेऽस्मिन् गणितेन या ग्रहगतिस्तन्नामिधानस्त्वसौ
होरान्योऽङ्गविनिश्चयश्च कथितः स्कन्धस्तृतीयोऽपरः॥
I.9.
3. गणितं जातकं शाखां यो वेत्ति द्विजपुंगवः।
त्रिस्कन्धज्ञो विनिर्दिष्टः संहितापारगश्च सः॥

4. *Āṅga* is used for the third branch in *BS*, I.8; *BY*, II.9.
5. *BS*, Vol.I, p.21.
6. *BS*, Vol.I, p.73.
7. यस्तु सम्यग्विजानाति होरागणितसंहिताः ।
अभ्यर्च्यः स नरेन्द्रेण स्वीकर्तव्यो जयैषिणा ॥
II.19.
8. स्कन्धैस्त्रिभिर्ज्योतिषसंग्रहोऽयं मया कृतो दैवविदां हिताय ।
BJ, XXVIII.6.
9. Kern finds it difficult to solve this problem and has to assume (*BS*, Introduction, p.23) that it was through the Greeks that Indians were 'acquainted with two separate branches of the knowledge of stars' (the one really scientific, the other quasi-scientific). No final word has yet been said as to whether Indians really borrowed much from the Greeks and if so at what time. Moreover, in dealing with semasiological history of the word *saṃhitā* we need not go into the question of Greek influence. This problem is discussed subsequently. As is evident from the distich cited in note 3 above, this three-fold classification was well-known as early as the time of Garga and may be still earlier.
10. *HIA*, p.7; P.C. Sengupta, *Khaṇḍakhādya*, Engl. Tr., P.I.
11. *PS*, Introd., p.8.
12. सूर्यः पितामहो व्यासो वसिष्ठोऽत्रिः पराशरः ।
कश्यपो नारदो गर्गो मरीचिर्मुनिरंगिराः ॥
लोमशः पौलिशश्चैव च्यवनो यवनो भृगुः ।
शौनकोऽष्टादशाश्चैते ज्योतिःशास्त्रप्रवर्तकाः ॥
(quoted in Sudhākara Dvivedī's *Gaṇaka-taraṅgiṇī*, p. 1).
13. तत्र ग्रहगणिते पौलिशरोमकवासिष्ठसौरपैतामहेषु पंचस्वेतेषु सिद्धान्तेषु...
BS, II, p. 22.
14. पौलिश-रोमक-वासिष्ठ-सौर-पैतामहाश्च पंच सिद्धान्ताः ।
PS, I.3a
पंचभ्यो द्वावाद्यौ व्याख्यातौ लाटदेवेन ।
PS, I.3b.
15. Bhāskara I in his comm. on *Āryabhaṭīya*, Kālakriyā, verse 10, observes:—*Etad=ev-Āryabhaṭasya śāstra-vyākhyāna-samaye Pāṇḍuraṅgaswāmī-Lāṭadeva-Niśśaṅku-prabhṛtibhyaḥ provāca*, cf. P.C. Sengupta, *Khaṇḍakhādya*, Engl. Tr., Introd., p.xix.
16. पौलिशकृतः स्फुटोऽसौ तस्यासन्नस्तु रोमक प्रोक्तः ।
स्पष्टतरः सावित्रः परिशेषौ दूरविभ्रष्टौ ॥
PS, I.4.
17. *BS*, II, pp.22-56.
18. *Ibid.*, II, p.68.

19. *Pratiṣṭhā-yātrā-vivāh-ādinām langa-graha-vaśena ca śubh-āśubha-phalam jagati yayā niściyate sā horā*, Utpala on I.9.
20. *BS*, II, p.71
21. सप्तर्षीणां मतं यच्च संस्कृतं प्राकृतं च यत्।
यानि चोक्तानि गर्गाधिरात्राकारैश्च भूरिभिः॥
LXXXV.3.
22. Cf. *YY*, I.2. सामुद्रयात्रिकनिमित्तशतैः पृथक्त्वैः।
23. *BS*, II, pp.73-74.
24. तथा च भगवान् गर्गः
अधिकृत्य ग्रहक्षादि जगतो येन निश्चयः।
तदङ्गमुत्तमं विन्द्यादुपाङ्गं शेषमुच्यते-इति॥
Cf. Utpala—... तथोपाङ्गानि तत्रैव पठितानि पुरुषलक्षणस्त्रीलक्षणवस्त्रोपानच्छेदरत्नलक्षणदीपदन्तकाष्ठलक्षणादीनि।
एतदुक्तं भवति। ग्रहनक्षत्राशीनाश्रित्य यदुक्तं तान्यङ्गानि परिशिष्टान्युपाङ्गानि-इति।
25. मुनिविरचितमिदमिति यच्चिरन्तनं साधु न मनुजग्रथितम्
तुल्येऽर्थेऽक्षरभेदादमन्त्रके का विशेषोक्तिः॥
I.3.
26. आब्रह्मादिविनिःसृतमालोक्य ग्रन्थविस्तरं क्रमशः।
क्रियमाणकमेवैतत्समासतोऽतो ममोत्साहः॥
I.5.
27. प्रश्नप्रतिप्रश्नकथाप्रसंगान् स्वल्पोपयोगान् ग्रहसम्भवांश्च।
सन्त्यज्य फल्गूनि च सारभूतं भूतार्थमर्थैः सकलैः प्रवक्ष्ये॥
I.11.
28. हीनातिरिक्तकाले फलमुक्तं पूर्वशास्त्रदृष्टत्वात्।
स्फुटगणितविदः कालः कथंचिदपि नान्यथा भवति॥
V. 25.
29. एतदौत्पातिकम्। यतो गणितगोलवासनया दक्षिणोत्तरयोर्दिशोर्ग्रामोक्षौ न भवतः। कदाचिदपि आचार्येण
पूर्वशास्त्रानुसारेणोक्तम्।
30. एतदप्यौत्पातिकम्। यतो गणितगोलविरुद्धम्।
31. अत्र यद्यप्यसम्भवस्तथापि पूर्वशास्त्रानुसारेणाचार्येणोक्तम्।
32. विचरन् श्रवणघनिष्ठाप्राजापत्येन्दुवैश्वदेवानि।
मृदून् हिमकरतनयः करोत्यवृष्टिं सारोगभयाम्॥
VII.2.
33. मर्दनमत्र श्रवणमध्यात्केषाचित्सम्भवति केषांचिन्न सम्भवति। आचार्येणोक्तं पूर्वशास्त्रानुसारेणेति।
34. यद्यपि गणितवासनयैतन्नोपपद्यते तथापि पराशरमङ्गीकृत्याचार्येणोक्तम्..... न केवलं पराशरेणोक्तं यावद् गर्गादिभिरपि
..... तथा च कश्यपः..... आचार्यस्यैतन्नाभिमतम्। यतः समाससंहितायामनेनैवोक्तम्....
35. दृश्यते स किल हस्तगतेऽर्के रोहिणीमुपगतेऽस्तमुपैति।
XII.21.
36. यद्यप्यत्र गणितसाम्यं न भवति तथाप्याचार्येण पूर्वशास्त्रदृष्टत्वात् कृतम्.... एवं पूर्वशास्त्रदृष्टत्वादाचार्येणात्रोक्तम्।

37. See *supra* Ch. VI.

38. म्लेच्छा हि यवनास्तेषु सम्यक् शास्त्रमिदं स्थितम्।
ऋषिवत्तेऽपि पूज्यन्ते किं पुनर्देवविद् द्विजः॥

II.14.

39. The Sanskritised loan-words from Greek astrology are—*kriya, tāvuri, jītuma, leya, pāthēna, dyūka* or *jūka, kauryya, taukṣika, ākokera, hṛdroga, iṭṭham, heli, himna, ara, jyo, koṇa, asphujit, horā, kendra, dreskāna* or *drekkāṇa, liptā, anophā, sunaphā, durudhara, kemadruma, veśi, āpoklima, panaphara, hibuka, jāmitra, mesūraṇa, dyūnam, dyutam, riḥpha, kulīra* and *trikoṇa*, cf. Weber, *History of Indian Literature*, pp.254-55. Kern, *Introd. to BS*, pp.28-29, fn.I excludes *kendra* and *kulīra* from the list and adds one new word, viz., *harija*.

40. Weber, *History of Indian Literature*, p. 253, fn. 277; Keith, *History of Sanskrit Literature*, p. 518.

41. Weber, *op.cit.*, pp.252-53, Whitney, *Sūryasiddhanta* Tr. note on I.

42. Keith, *op.cit.*, p.531.

43. Kern, *Introd. to BS*, pp.23, 28-29, 48-50, 52; Weber, *History of Indian Literature*, pp.251ff; Whitney and Burgess, *Appendix to Sūryasiddhānta* Tr. pp.380-87, 387-92; Keith, *History of Sanskrit Literature*, pp. 525-28, 530-31, Thibaut, *Introd. to PS*, pp.lxvi ff; *HIA*, pp.492-524.

44. In two volumes, Cambridge (Mass.) and London, 1978; see also his "The Yavanajataka of Sphujidhvaja," *JOR*, Madras, XXXI, 1981-82, pp.16-31, for a general account.

45. *Mīnarāja-viracitaṃ Vṛddhayavana-jātakam*, 2 Vols., Oriental Institute, Baroda, 1976.

46. यानत्रेरुत्पातान् गर्गः प्रोवाच तानहं वक्ष्ये।

XLV.1.

47. गार्गीयं शिखिचारं पाराशरमसितदेवलकृतं च।

XI.1.

48. श्लोकांश्चासित-देवल-कश्यपमुनिचोदितान् वक्ष्ये।

BY, XIX.1.

49. वृश्चिकवृषप्रवेशे भानोर्ये बादरायणेनोक्ताः।

ग्रीष्मशरत्सस्यानां सदसद्योगाः कृतास्त इमे॥

XXXIX.1.

50. *JBBRAS*, 1948-49, p. 5.

51. मेघोद्भवं प्रथममेव मया प्रदिष्टं ज्येष्ठामतीत्य बलदेवमतादि दृष्ट्वा।

LIII.125.

52. या व्याख्याता शान्तिः स्वयम्भुवा सुरगुरोर्महेन्द्रार्ये।

तां प्राप्य वृद्धगर्गः प्राह यथा भागुरेः शृणुत॥

XLVII.2.

53. चाषः सनकुलो वामो भृगुराहापराहृतः।

LXXXV.43b.

54. ऋज्यतिवक्रा वक्रा विकला च मतेन देवलस्यैताः॥
पंचचतुर्द्व्येकाहा ऋज्यादीनां षडभ्यस्ताः॥

VII.15.

55. भारद्वाजमतं दृष्ट्वा यच्च श्रीद्रव्यवर्धनः।
आवन्तिकः प्राह नृपो महाराजाधिराजकः॥

LXXXV.2.

56. श्रीद्रव्यवर्धनाख्यो महाराजाधिराजवंशप्रसूत आवन्तिक उज्जयिन्या नृपो राजा....
57. *IHQ*, XXXIII, pp.314-320; *Studies in Indology*, Vol.I, pp.206-212; Vol. II. pp. 180-84.
58. *IHQ*, XXXV, pp.73-75. Buddha Prakash (*Aspects of Indian History and Civilization*, pp.89-100) thinks that Mahārājādhirāja Dravyavardhana was a successor of Yaśodharman-Viṣṇuvardhana, the latter being the first ruler in the Aulikara family to attain the rank of *Mahārājādhirāja-Paramēśvara*.
59. संख्याविधानात् प्रतिदेशमस्य विज्ञाय सन्दर्शनमादिशेज्ज्ञः।
तच्चोज्जायिन्यामगतस्य कन्यां भागैः स्वराख्यैः स्फुटभास्करस्य॥

XII.14.

60. तथा च समाससंहितायाम्।
सप्तभिरंशैः कन्यामप्राप्ते रोमके तु दिवसकरे।
दृश्योऽगस्त्योऽवन्त्यां तत्समपूर्वापरेऽप्येवम्॥
61. For references to epigraphic evidence, *vide* Ch. I above.
62. Kern, *BS*, Introd., pp.34-35. Alberuni (I.157) also refers to Garga as a *Samhitā*-writer.
63. *BS*, Introd., p.30; *JRAS*, N.S. IV (1870), p.431 fn.
64. *JBBRAS*, 1948-49, p.7.
65. *BS*, Introd., pp.34-35.
66. *JBBRAS*, 1948-49, p.8.
67. *Ibid.*, 1948-49 p.9.
68. Oppert's *List of Sanskrit MSS. in Private Libraries of South India*, I, p. 476, mentions a *Mānava-vāstu-lakṣaṇa* which must be a later work.
69. *BS*, Introd., p.42
70. *JBBRAS*, XXIV-XXV, p.12.
70.a The *Viṣvabrahmakulotsaha* by Pandita Narayan Raoji Kshiragar (Poona, 1921, p.52, *Samgraha* iii) refers to the *Manutantra* and *Manusara*. Information kindly supplied by Shri. G.G. Joshi.
71. For a list, see Acharya, *Dictionary of Hindu Architecture*, pp.769-70.
72. यद् दानवेन्द्राय मयाय सूर्यः शास्त्रं ददौ सम्प्रणताय पूर्वम्।
विष्णोर्वसिष्ठश्च महर्षिमुख्यो ज्ञानामृतं यत् परमाससाद॥
पराशरश्चाप्यधिगम्य सोमाद् गुह्यं सुराणां परमाद्भुतं यत्।
प्रकाशयाञ्चक्रुरनुक्रमेण महर्द्धिसन्ते यवनेषु तते॥

73. Weber, *History of Indian Literature*, p.253; *Indisch Studien*, II, p.242.

74. *Suryasiddhānta* Tr., p.4.

75. शतमेकाधिकमेके सहस्रमपरे वदन्ति केतूनाम्।
बहुरूपमेकमेव प्राह मुनिनारदः केतुम्॥

XI.5.

76. दिव्यान्तरिक्षगो भौम एकः केतुः प्रकीर्तितः।
शुभाशुभफलं लोके ददात्यस्तमयोदयैः॥

77. सुरनिलयशिखरिशिखरे बृहस्पतिर्नारदाय यानाह।

78. रविशशिनोः पञ्चयुगं वर्षाणि पितामहोपदिष्टानि।
अधिमासस्त्रिंशद्भिर्मासैरवमो द्विषष्ट्या तु॥

PS, XII.1.

79. सैकषष्ट्यंशे गणे तिथिर्भार्क नवाहतेऽक्षयर्केः।
दिगुरसभागैः सप्तभिरूनं शशिभं धनिष्ठाद्यम्॥

PS, XII.3.

80. प्रणिपत्यैकमनेकं कं सत्यं देवतां परं ब्रह्म।
आर्यभटस्त्रीणि गदति गणितं कालक्रियां गोलम्॥
आर्यभटीयं नाम्ना पूर्वं स्वायम्भुवं सदासद् यत्।

81. ब्रह्मोक्तं ग्रहगणितं महता कालेन यत् खिलीभूतम्।
अभिधीयते स्फुटं तत् जिष्णुसुतब्रह्मगुप्तेन॥

Brāhmasphuṭasiddhānta, 1.2

A definite date for the composition of the original *Paitāmaha Siddhānta* cannot be fixed for want of sufficient data. In PS, XII.2 (*Dvy-ūnam Śakendrakālam pañcabhir-uddhṛtya śeṣa-varṣāṇām*) Varāhamihira gives rule for fixing a point from which the quinquennial *yugas* are to be counted. He asks us to deduct 2 from Śakendrakāla, and to divide the remainder by 5, a process which would enable us to find out the number of *yugas* at any given time. It supposes a new *yuga* to commence when two Śaka years have gone. Dikshit (*HIA*, p.151) holds that the *Paitāmaha* was composed long before the Śaka era, the introduction of Śakendrakāla being due to Varāhamihira who uses it with the sole purpose of bringing out *ahargaṇa*. Thibaut (*PS*, Introd., p.xxvi), on the other hand, thinks that this rule was contained in the *Paitāmaha* itself, for had Varāhamihira added it himself, he 'would most likely have adapted it to the same initial date as the other *Siddhāntas*, viz., 427 Śaka. According to this view, the *Paitāmaha* may be assigned to any date after the 3rd year of the Śaka era.

82. *JBBRAS*, XXIV-XXV, p. 15.

प्राकृतविमिश्रसंक्षिप्ततीक्ष्णयोगान्तघोरपापाख्याः।
सप्त पराशरतन्त्रे नक्षत्रैः कीर्तिता गतयः॥

VII.8.

83. युद्धं चतुष्प्रकारं पराशराद्यैर्मुनिभिरुक्तम्।

XVII.3.

84. भेदनमारोहणमुल्लेखनं रश्मिसंसर्गश्चेति ग्रहयुद्धं चतुर्विधमाचक्षते कुशलाः। तेषां पूर्वार्थपूर्वो गरीयान्।

85. BS, Preface, p.33.
86. पाराशरीया संहिता केवलमस्माभिर्दृष्टा न जातकम्। श्रूयते स्कन्धत्रयं पराशरस्येति। तदर्थं वराहमिहिरः शक्तिपूर्वैरित्याह।
87. Weber, *Ind., Stud.*, II, p.260; *History of Indian Literature*, p.253; Keith, *A History of Sanskrit Literature*, p.518.
88. Weber, *History of Indian literature*, pp.253-54, fn. 277.
89. *Ind. Stud.*, II. p. 260.
90. BS, Introduction, pp.48-90. Also cf. HIA, p.164.
91. तथा च पुलिशसिद्धान्ते दिव्येन मानेन पठ्यन्ते।
अष्टाचत्वारिंशत्पादविहीना क्रमात् कृतादीनाम्।
अब्दास्ते शतगुणिता ग्रहतुल्ययुगं तदेकत्वम्॥
92. HIA, p.163; IA, XIX. (1890), p.52, fn.18.
93. Thibaut, *PS*, Introd., pp. XXVI-XXVII.
94. लाटासूर्यशशांकौ मध्याविन्दूच्चचन्द्रपातौ च।
कुजबुधशीघ्रबृहस्पतिसितशीघ्रशनैश्चरान् मध्यान्॥
युगयातवर्षभागान् वासिष्ठान् विजयनन्दिकृतपादान्
मन्दोच्चपरिधिपातस्पष्टीकरणाद्यमार्यभटात्॥
श्रीषेणेन गृहीत्वा रलोच्चयरोमकः कृतः कन्या।
Brāhmasphuṭasiddhānta, XI. 48-50a.
95. S.B. Dikshit "The Romaka siddhānta," IA, XIX. (1890), pp. 142, 439; HIA, pp.158-60.
96. यच्छक्रशुक्रवागीशकपिष्ठलगुरुत्सताम्
मतेभ्यः प्राह ऋषभो भागुरेर्देवलस्य च॥
LXXXV.1.
97. ये च न दोषान् जनयन्त्युत्पातास्तानुत्सवभावकृतान्।
ऋषिपुत्रकृतैः श्लोकैर्विद्यादेतैः समासोक्तैः॥
XLV.82.
98. For some examples, see *JBBRAS*, XXIV-XXV (1948-49) p. 16.
99. युद्धं यथा यदा वा भविष्यमादिश्यते त्रिकालज्ञैः।
तद् विज्ञानं करणे मया कृतं सूर्यसिद्धान्ते॥
XVII.1.
- Sūryasiddhāntāt* is another reading. P.C. Sengupta (*Sūryasiddhānta*, Engl. Tr. Introd., pp.xxix, xli; *Khaṇḍakhādya*, Tr. Introd., p.xviii) takes this verse to support his view that the original *Sūryasiddhānta* was in an amorphous condition before the time of Varāhamihira who gave it a crystalline structure by including in it new material and constants from Āryabhaṭa's Ārdharātrika system.
100. Thibaut, *PS* (Lahore ed.), Introd., pp.xiv-xxiv; HIA, p.167.
101. तथा च सूर्यसिद्धान्ते।
महतश्चाप्यधःस्थस्य नित्यं भासयते रविः।

अर्धं शशांकबिम्बस्य न द्वितीयं कथंचन॥

on IV.1.

तेजसां गोलकः सूर्यो ग्रहर्क्षण्यम्बुगोलकाः।

प्रभावन्तो हि दृश्यन्ते सूर्यरश्मिविदीपिताः॥

on IV.2.

विप्रकर्षं यथा याति ह्यधःस्थश्चन्द्रमा रवेः।

तथा तथास्य भूदृश्यमंशं भासयते रविः॥

on IV.3.

इन्दुना छादितं सूर्यमधोऽविक्षिप्तगामिना।

न पश्यति यदा लोकस्तदा स्याद् भास्करग्रहः॥

तमोमयस्य तमसो रविरश्मिपलायिनः।

भूच्छाया चन्द्रबिम्बं च स्थाने द्वे परिकल्पिते॥

on V.11.

102. *HIA*, pp. 160, 168.

103. P.C. Sengupta, *Introd. to Sūryasiddhānta Tr.*, pp.xxviii-xxix, xliii.

104. *Ibid*, p.xxx

105. छत्रध्वजप्रहरणान्यभिमन्त्रितानि कुर्वन्ति शत्रुकदनं रिपुवाहिनीनाम्।

मन्त्रं जगाद भगवानुशनाश्च शास्त्रे यल्लिख्यते तदिह पूर्वविधिक्रमेण॥

YY, XVII.1.

106. Thibaut, *PS* (Lahore), *Introd.*, pp.xxxii-xxxiv; *HIA*, pp. 154-56, 187-88.

107. For a detailed discussion of this question see our paper "Nagnajit and his Citralakṣaṇa" in *BV*, XXII, pp. 57-62; *Varāhamihira and his Times*, pp.91-99.

108. For a list of some such works, see Acharya, *Dictionary of Hindu Architecture*, s.v. Viśvakarman.

109. T. Bhattacharya, *Study on Vāstuvidyā*, p.107.

110. *JRAS*, 1873 (VI), p.285, fn. 2.

111. *Viśvakarma-prakāśa*, II. 169-70 in Venkateshwar Press ed. and II. 175-176 according to Banaras ed.

112. For a full discussion of this and connected problems see our paper "Varāhamihira's place in the History of Vāstuvidyā" in Dr. *Mirashi Felicitation Volume*, pp.318-35.

113. उक्तं चाचार्यविष्णुगुप्तेन। तथाह।

अप्यर्णवस्य पुरुषः प्रतरन् कदाचिदासादयेदनिलवेगवशेन पारम्।

न त्वस्य कालपुरुषाख्यमहार्णवस्य गच्छेत्कदाचिदनृषिर्मनसापि पारम्॥

II.4.

114. आयुर्दायं विष्णुगुप्तोऽपि चैवं देवस्वामी सिद्धसेनश्च चक्रे।

दोषश्चैषां जायतेऽष्टावरिष्टं हित्वा नायुर्विशतेः स्यादधस्तात्।

BJ, VII.7.

115. न कुम्भलग्नं शुभमाह सत्यो न भागभेदाद्यवना वदन्ति।

कस्यांशभेदो न तथास्ति राशेरतिप्रसंगस्त्विति विष्णुगुप्तः॥

Ibid., XXI.3.

116. *JBBRAS*, XXIV-XXV, p.18

117. तुरगाणामत्रार्थाः प्रक्षिप्ता विष्णुगुप्तकृताः।

BY, XXII.4.

118. नक्षत्रमतिपृच्छन्तं बालमर्थोऽतिवर्तते।

अर्थो ह्यर्थस्य नक्षत्रं किं करिष्यन्ति तारकाः॥

Arthaśāstra, IX.4, p. 351.

119. *JBBRAS*, XXIV-XXV, p.19.

120. शस्त्रेण वेणीविनिगहितेन विदूरथं स्वा महिषी जघान।

विषप्रदिग्धेन च नूपुरेण देवी विरक्ता किल काशिराजम्॥

LXXVII.1.

120a *Arthaśāstra*, I.20, p.41. Also cf. *Kāmandakīya Nītisārā*, VII, 51-54; *Harṣa-carita*, VI.

121. For references, *vide JBBRAS*, XXIV, XXV, p.19.

122. *Arthaśāstra*, II.32, last verse.

123. वार्ता जगत्यवितथाऽविकला त्रयी च सम्यक् चरत्यपि मनोरिव दण्डनीतिः।

अध्यक्षरस्वभिनिविष्टधियोऽपि केचिदान्वीक्षिकीषु च परं पदमीहमानाः॥

XIX.11.

124. See also H.C. Chakladar, *Social Life in Ancient India, A Study in Vātsyāyana's Kāmasūtra*, pp. 23-24.

125. Also mentioned in *YY*, I.2.

126. *ZDMG*, XLIV, pp.4-15, The list has been reproduced with minor additions by H. D.Velankar, *JBBRAS*, XXIV-XXV, pp. 63-64.

127. आर्याणामपि कुरुते विनाशमन्तर्गुर्विषमसंस्थः।

गण इव षष्ठे दृष्टः स सर्वलघुतां जनं नयति॥

CIII.51.

128. पंचमं लघु सर्वेषु सप्तमं द्विचतुर्ययोः।

यद्वच्छ्लोकाक्षरं तद्वल्लघुतां याति दुःस्थितैः॥

CIII.57.

129. प्रकृत्यापि लघुर्यश्च वृत्तबाह्ये व्यवस्थितः।

स याति गुरुतां लोके यदा स्युः सुस्थिता ग्रहाः॥

CIII.58.

130. विपुलामपि बुद्ध्या छन्दोविचितिं भवति कार्यमेतावत्।

श्रुतिसुखदवृत्तसंग्रहमिममाह वराहमिहिरोऽतः॥

CIII.64

131. *Piṅgalachandaḥśūtra*, VII.34.

132.राजमाण्डव्यौ वर्जयित्वा... तथा च तावूचतुः।

सुवर्णश्चण्डवेगश्च प्लवो जीमूत एव च।

बलाहको भुजंगश्च समुद्रश्चेति दण्डकाः॥

133. *C.K. Raja Presentation Volume*, Madras, 1946 pp.141-52. *Vide also JABRAS*, XXIV-XXV, 1948-49, pp. 63-64.

Appendix 1

Genesis of Varāhamihira's Name

Varāhamihira, perhaps, commands the highest reputation in the field of Indian astronomy and astrology, both called Jyotiṣa, comparable only to that of Kalidasa as a poet and dramatist. However, his name, especially the combination of its two components,¹ has posed an enigma to some medieval and modern writers alike and some legendary and laboured explanations have been offered. Possibly the late Jaina tradition seeking to make Varāhamihira a brother of Bhadrabāhu and contemporary of king Nanda emanates, among others, from some such effort, this being the earliest extant legend (14th century AD). Thus, according to a story recorded by the Jaina author Merutuṅga in his *Prabandha-cintāmaṇi* in Pāṭaliputra there lived a Brāhmaṇa boy named Varāha who had ever since his birth an abiding interest in astrology; but owing to utter poverty he had to subsist by tending cattle. Once he drew a horoscope on a rock but forgot to efface it before returning home in the evening. On remembering it he went back to the spot at night and found a lion sitting over it but effaced the drawing courageously by putting his hand under the lion's body. Thereupon the animal assumed his real form as the Sun-god and told him to ask a boon. Varāha entreated him to show him the entire circle of stars and planets whereupon the god seated him in his chariot and enabled him to examine closely the movements of all the heavenly bodies. On returning after a year he became known as Varāhamihira in allusion to the favour of Mihira (Sun-god), was patronised by king Nanda and composed an astrological treatise called *Vārāhi Saṁhitā*.² The remainder of the story, which was obviously motivated by the desire to show the superiority of Bhadrabāhu over Varāhamihira and of Jaina astrology over its Brahmanical counterpart, does not concern us in the present context.

According to a marvelous story allegedly based on some old Gujarati text narrated by B. Sūryanarayana Rao, Ādityadāsa and Satyavatī *alias* Indumatī got a son in their fifties and christened him Mihira as he was born in fulfilment

of a boon of Sūrya. Impressed by his extraordinary knowledge of astrology, king Vikramāditya made him a gem of his court. On Vikramāditya being blessed with a son, Mihira predicted his (son's) demise by a boar on a certain day in the 18th year, which came true in spite of all possible precautions. The king was greatly impressed and conferred on Mihira the emblem and style of Varāha, as a result of which he came to be known as Varāhamihira.³

The above stories are apparently intended to explain the rather unique name Varāhamihira. An attempt to explain this unique nomenclature is at the root of the theory of A.N. Upadhye identifying Varāhamihira with Buzūrmehr of some Persian traditions and regarding the latter as the original of the former which was only a more easily pronounceable form.⁴ These stories, late and unconvincing as they are, fail to explain the true genesis of the name which can be understood only with the help of some ancient traditions backed by art evidence put in its right perspective.

Sun-worship was Varāhamihira's family religion, and he was also a devotee of the Sun. He offers obeisance to Sūrya in the beginning of all his works except only *Vivāha-ṭāṭala* which, naturally enough, commences with an invocation to god of love. He was believed to have been born by the blessings of the Sun who had also sharpened his intellect. In later times Varāhamihira came to be regarded as an incarnation of the Sun; perhaps a natural transformation from being favoured by the god to being regarded as his emanation. The feat of composing numerous exhaustive and abridged texts on all the different branches of Jyotiṣa, which is so very closely associated with the sun playing pivotal role in the firmament, which Varāhamihira achieved so very remarkably, also might have contributed vitally to this development. The inclusion of the word *mihira* in the name also might have facilitated it.

The form of Sūrya worshipped by him was that popularised in India by the Magi or Maga priests of Iran. This would follow from his description of the iconographic features of the god which represent the re-oriented form and from the statement that the Magas were the appropriate priests for the installation of Sūrya icons. The Magi priests were originally inhabitants of Medea and after its conquest by Cyrus I they gradually spread to other parts of the Achaemenian empire including Iran where they got a foothold in Zoroastrianism. They entered India in waves, the first wave coming to north-western India about the sixth-fifth

century BC in the wake of the inclusion of the Indian borderland in the Achaemenian empire. The second wave entered India in the second-first century BC along with the Scytho-Parthian invaders and played a transforming role in the history of the Sun-cult. The episode of their immigration into India is narrated in detail in some of the Purāṇic texts which were probably intended to incorporate special features introduced by them in the solar cult and elevate their social status. The growth in the popularity of the new form of the cult was facilitated by the belief in the power of the sun to cure the leprosy which is vouched for by Herodotus (I.138) as well as the story of Sāmba who was reportedly responsible for the importation of the Iranian form of the Sun-cult in India. By the sixth century AD, when Varāhamihira flourished, this cult was already well-entrenched.

The name Varāhamihira is highly significant in this context inasmuch as it indicates that even though the Magi priests were completely Indianised and assimilated in the Brāhmaṇical fold with the status of the Brāhmaṇas, their Iranian origins were not altogether forgotten. The second component of the name, viz. Mihira, was distinctly of Iranian origin, being a Sanskritised form of Avestan Mihr, which happens to be derived from Mithra, the same as Vedic Mitra. The other component, Varāha, also in this particular combination is a Sanskritised derivative from Iranian 'varāza'.⁵ According to a hymn from the *Mihr Yasht*, a part of the *Avestā*, Mihr in his march is preceded by Verethraghna,⁶ the god of victory and strength, in the form of a boar, i.e., varāza.⁷ The Boar incarnation of Verethraghna is described almost in the same fashion in the *Bahrām Yasht* (5.15).⁸ These passages clearly show that the word *parāha* in the name Varāhamihira has a reference to the Boar manifestation of Verethraghna and goes well with the second component, *mihira*, the sun, whose companion and harbinger he was.⁹ It would not be out of context to mention here that the Mobādān Mobād of the Sassanian monarch Bahrām V (AD 420-438), who was himself a Zoroastrian, bore the name Mihrvarāza,¹⁰ which is obviously identical with Varāhamihira, the only noteworthy difference being the change in the position of the two components of the name in which *varāha* or boar plays a more prominent role. As suggested by Sanjana, the Iranian counterpart of the name Varāhamihira must have been Varāzmihr, and some very near ancestor of his was a full-blooded Iranian Maga priest.¹¹

The alteration in the position of the two components of the name, which was apparently deliberate, calls for some explanation which is not very difficult to

find out. It would follow from the Avestan evidence cited above that according to a strong Zoroastrian tradition the Sun was closely associated with the boar (*varāza*) who was himself a representative or incarnation of Verethraghna who is evidently the same as the Vedic Vṛtrahan or Indra. Thus there appears to have existed a powerful cult centring around the Sun and the Boar who was the former's forerunner. This cult may conveniently be called Mihrvarāza which appears to have enjoyed great popularity till at least the fifth century AD, as indicated by the name of the Mobadān Mobād of the Sassanian emperor Bahrām V. In India also during the Ṛgvedic period Sūrya was a very important god and Viṣṇu was regarded as one of his aspects, his most characteristic attribute consisting of his three strides really symbolising an activity of the Sun according to ancient Vedic commentators.¹² However, in the later Vedic age Viṣṇu was on a march to gradual rise in the status and in the post-Vedic period he succeeded in attaining a pre-eminent position in the Hindu trinity of gods, the other two members being Brahmā and Śiva, and concurrently Sūrya's importance declined though he continued to be worshipped as an independent god with an independent cult, Saura, centring around him. And Varāha was originally associated with Prajāpati who is stated in the *Śatapatha Brāhmaṇa* (XIV.1.2) to have raised the earth from the bottom of the ocean in the form of a boar.¹³ But in later times it came to be regarded as an incarnation of Viṣṇu by the process of transferring this function from Prajāpati to Viṣṇu after the latter rose to the position of the supreme godhead.¹⁴ In the Iranian tradition, as has been shown above, Varāha was regarded as an incarnation of Verethraghna, i.e., Vṛtrahan Indra.¹⁵ In India, on the other hand, Viṣṇu is often described as the younger brother of Indra,¹⁶ thereby making the transfer of Varāha from Indra to Viṣṇu an easy process. And since Verethraghna himself was closely connected with the Sun, it became easier still.

This transformation appears to have been completed long before the time of Varāhamihira and the result was the emergence of what may be conveniently called the Varāhamihira cult. Our author was, of course, named after this cult, and it may be reasonably supposed that one of his close ancestors must have been a follower of this Indianised version of the Zoroastrian cult. And this went well with the Indianised Magi priests who had to cope with the tide of Sanskritic culture while at the same time retaining their separate identity. In course of time they managed to merge in the Hindu society and contribute a lot to its culture, and today they have become a part and parcel of the Hindu social set up and

are distinguishable only by such names as Śākadvīpin, Sevaka, Bhojaka, Graha-Vipra or Ācārya Brāhmaṇa, which are obviously subcaste-names among the Brāhmaṇas, prevalent in different parts of North India. Its significance can be gauged when it is contrasted with a later wave of the Persian immigrants in the seventh century AD who could not be absorbed in the Hindu society which had lost its flexibility characterising it earlier and still maintain their religion and culture closely guarded and are popularly known as Parsees.

That the Varāhamihira cult had become well-entrenched by about the second century AD is clearly indicated by an interesting stone sculpture now weather-beaten, hailing from somewhere near Mathura and deposited in the Archaeological Museum at Mathura (Accession No. 65.15). It is a fragmentary slab depicting from right to left a standing devotee with hands in the *añjali murā*, a four-armed standing figure of Varāha, a male figure holding bow and arrow, apparently a soldier, and a princely figure in half-reclining posture, which is preserved only up to the waist. It is difficult to ascertain the relationship of the last two figures with the central figure of Varāha. The Varāha figure is broken in the upper part and is now headless, standing in the *ālīḍha* pose with his legs kept apart, and the two lower hands kept in the *kaṭi-hasta* attitude. The two upper hands carry the figures of the Sun and the Moon shown riding a two-horsed chariot each embossed on discs.¹⁷ The figure's face is turned to right and is now mutilated. Near the mouth goddess Pṛthivī (earth) is shown as a small female figure carrying a bud-like object in her right hand. Varāha is wearing a tight-fitting garland (*grāiveyaka*), armlets and bracelets, waist-band (*kāya-bandhana*) and a *dhoti* with its ends collected and hanging between the legs and touching the ground, and has the *śrīvatsa* mark on the chest. The panel bears a short dedicatory inscription in Brāhmī on its lower rim; it is now fragmentary giving no information of any consequence but sufficient to show that the panel belongs to about the second century AD¹⁸ (Fig.25). The composition is of great value as it shows a combination of Varāha and the solar figures. It occupies a unique place in the history of the Varāhamihira cult in India, but its importance from this point of view has not been appreciated so far.

In fact, it has been rightly pointed out by Kalpana Desai that according to the ancient Indian tradition Varāha himself was identical with the Sun¹⁹ which must have facilitated the growth of the Varāhamihira cult. Thus, right from the time of the *Rgveda* Varāha was referred to as Vṛṣākapi²⁰ and Vṛṣākapi is identified

with Āditya (Sun) in the *Gopatha Brāhmaṇa* (II.6.12). In later literary texts this equation of Vṛṣākapi with the Sun or Agni is maintained. In the *Mahābhārata* (XIII.70.91), the *Harivaṃśa* (III.33.15) and the *Matsya Purāṇa* (CCXLVI.15), for example, he is spoken of as one of the Rudras and identified with the Sun or Fire. V.S. Agrawala is inclined to regard Agni and Sūrya as the names of Varāha and invites our attention to the *Bhāgavata* description of the *trayīmaya saukara rūpa* and the *Śatapatha Brāhmaṇa* (X.5.2.2) according to which the *trayī* or triple world-building force is symbolised by Sūrya.²¹ And lastly, Chāyā, the spouse of Sūrya, is described in some of the Purāṇas as the companion of Varāha.²²

The continuance of the Varāhamihira cult during the Gupta period is vouched for by the well-known theriomorphic representation of Varāha, popularly known as Yajña-Varāha, at Eran which has the depiction of Sūrya and the *rāśis* on its necklace.²³

No other representation of Varāhamihira is as yet reported from anywhere in the Indian sub-continent, but the cult appears to have migrated to and been popularised in Central Asia in later times as indicated by certain paintings on the walls of a few caves. However, these figures have erroneously been taken as those of Gaṇeśa by scholars. One such fresco has been reported from the cave temples at Bazaklik. Here we have the figure of Varāha seated cross-legged on a lotus-seat and six-armed. He holds in his upper two hands symbolic disc-shaped representations of the Sun and the Moon, and in the remaining four hands a disc representing the earth, a battle-axe with streamers, an unidentifiable object and a curved stick-like object, probably a sword (Fig.25).²⁴ There are similar depictions of Varāha in caves 7 and 32 at the same site. In all these figures the snout of the boar is shown quite distinctly which should leave no doubt about its identification with Varāha. In fact, Alice Getty appeared quite convinced on this point at one stage and questioned the identity of this figure with the elephant-headed deity Gaṇeśa, but ultimately she succumbed to this identification on some grounds that appear quite flimsy.²⁵ Dhavalikar also echoes the same view and argues that what looks like the snout of the boar is in reality an unrealistic representation of the trunk of the god or rather an elongation of the nose itself. But he is also somewhat sceptical on this point and observes that 'the trunk of the god is not realistically depicted, what we see instead is a sort of snout like that of a boar.'²⁶ However, in addition to what we have stated above, the ears are too small for an elephant, the eyes and flames shown in the halo of

the god represent the fierce (*ugra*) aspect for which there is no room in the entire mythology of Gaṇeśa whereas this element is always present and natural in the Varāha figures, and the third disc held by the god and standing for the earth definitely proves that the figure is that of Varāha, and not of the elephant-headed god.

No other evidence of Varāhamihira cult is known so far; perhaps it disappeared in course of time.

Notes and References

1. The first part of the name, Varāha, is often known by itself to have been employed as a personal name and also formed part of some names. Varāhamihira himself is also frequently referred to both as Varāha and Mihira and the traditions recorded in later times speak of one of the components as his original name, the other being regarded as a title.
2. *Prabandha-cintāmaṇi*, ed. Jinavijaya Muni, Singhi Jaina Series, No.1, Santiniketan, 1939, Prakāśa V, pp.118-19. For the remainder of the story, see above, pp.18-19. *Varāhamihira and His Times*, Jodhpur 1991, Kusumanjali Prakashan, Ch.XII. This story is also narrated by Rajaśekharaśūri in his *Prabandhakośa* or *Caturimśati-prabandha* (ed. Jinavijaya Muni, Singhi, Jaina Series, No.6, Santiniketan, 1935) with minor differences of details.
3. *Life of Varāhamihira*, second ed., Bangalore, 1945.
4. *IHQ*, IX (1933), pp. 984-86. For its detailed examination, see Ajay Mitra Shashtri, "Fresh Light on the Life of Varāhamihira", *Journal of Oriental Institute*, XV, pp.376-77.
5. Cf. Jehangir E. Sanjana, "Varāhamihira: An Iranian Name", *Festschrift Dinshah Irani*, pp. 115-22; F.C. Davar, *Iran and India through the Ages*, p. 66; R.K. Arora, "The Magas, Sun-Worship and the Bhaviṣya Purāṇa", *Purāṇam*, XIII, p.68.
Foreign appearance of the name is recognised by D.D. Kosambi also. He compares it to that of the Epthalite invader Mihirakula. *Vide* his edition of the *Subhāṣitaratna-kośa*, Introduction, p. XLVI.
6. Cf. *Vṛtrahan* of the *Rgveda*, an epithet of Indra, who also, according to some Vedicists, was a god of strength and war. See K.C. Chattopadhyaya, *Studies in Vedic and Indo-Iranian Religion and Literature*, I, p. 100.
7. *Yenhe paurva-naemāt vazaitē Verethraghno Ahura-dhāto hukehrpa varaz ahe paiti-ereno, Mihr Yasht*, 18.
8. See J.E. Sanjana, *op.cit.*, p.116.
9. V.K. Rajwade also thinks that the name Varāhamihira is un-Indian and equates Varāha with *haura*, an imaginary form of Ahura (see *Rājavāḍelekha-saṃgraha*, Part

- III: *Samkirṇa Nibandha*, Poona, 1936; cited by J.E. Sanjana, *op.cit.*, pp. 115-16), which is palpably erroneous.
10. Muhammad Iqbal, *Irān ba'ahd-e Sāsāniān* (Urdu translation of the *L'Iran sous les Sassanides* by Arthur Christensen), p. 152, cited by J.E. Sanjana, *op.cit.*, p.122.
 11. J.E. Sanjana, *op.cit.*, p. 122.
 12. J.N. Banerjea, *DHI*, p. 385.
 13. According to the *Taittirīya Āraṇyaka*, the earth was raised from the waters by a hundred-armed black boar.
 14. A.A. Macdonell, *Vedic Mythology*, p.41.
 15. For Indra being an Indo-Iranian god, see S.R. Goyal, *A Religious History of Ancient India*, I, Meerut, 1984, pp.63-64.
 16. Cf. The Bihar stone inscription of Skandagupta (Fleet, *Inscriptions of the Early Gupta Kings and Their Successors*, CII, III, No.14, p.49, line 1) and the Alina Pls. of Maitraka Silāditya VII, (*ibid.*, No.39, p.174, line 14) where Viṣṇu is called *Indrānuja* and *Upendra* respectively.
 17. Originally N.P. Joshi believed that both the representations were of Sūrya ("A Varāha Image of the Kushāṇa Period", *Lalit Kala*, No.12, October, 1962, pp.46-47, *Mathura Sculptures*, Mathura, 1966, Appendix II, pp. iii-vii). But later he modified his view and identified the two figures as of the Sun and the Moon on the basis of certain literary references.
 18. N.P. Joshi, "Kushāṇa Varāha Sculpture", *Arts Asiatique*, XII, Rome, 1965, pp. 113-19; *Prāchīna Bhaṛatīya Mūrti-vijñāna* (Hindi), p.86; *Bhāratīya Mūrti-sāstra* (Marathi), pp.66ff.
 19. See her addendum to N.P. Joshi's note, *Lalit Kala*, No. 12, October 1962, p.47.
 20. Umakanta P. Shah, "Vṛśākapi in the Ṛgveda", *Journal of the Oriental Institute*, Vol. VIII, pp.411
 21. V.S. Agrawala, "Yajñavarāha: An Interpretation", *Purāṇam*, V, No.2, pp. 225ff.
 22. Cf. *Harivamśa*, III.34.41; *Vāyu*, IV.22; *Matsya*, CCXLVII.73, etc.
 23. N.P. Joshi, *Bhāratīya Mūrti-sāstra*, pp.67, 287.
 24. Other scholars have identified these objects somewhat differently. See Alice Getty, *Gaṇeśa—A Monograph on the Elephant-faced God*, second edition, New Delhi, 1971, p.41, fig. 4; M.K. Dhavalikar, "Gaṇeśa Figures in Central Asia", *Giridharaśrī: Essays on Indology*, (G.S. Dikshit Felicitation Volume), Delhi, 1987, pp.39-40, fig. 6. My attention to these figures has been drawn by my former colleague Dr. Chandrashekhara Gupta to whom I owe these identifications also. See also his "Some Syncretistic Representations of Some Pauranic Deities", *Prācī-Prabhā: Perspectives in Indology* (Essays in honour of Professor B.N. Mukherjee), New Delhi, 1989, pp. 235-38.
 25. Alice Getty, *op.cit.*, p.41,
 26. Dhavalikar, *op.cit.*, p.40.

Appendix 2

Polity and Government

King 466; Universal Sovereignty; Interstate Relations; *Mahārājādhirāja*; Chief Queen; Crown-prince; *Senāpati*; *Daṇḍādhyakṣa*; Ministers: *Purohita*; Other Officers: Forts: Army: Military Encampment: Military Operations: Weapons: *Praharāṇa* and *Āyudha*; Swords: Other Arms.

476-86



Varāhamihira's works do not add much to our knowledge of the administrative set-up of the country during the period represented by it. Nonetheless our study will remain incomplete without a reference to the data, albeit scanty, bearing on this important aspect of contemporary life. The present appendix is an attempt to remove this want.

The science of government is called *daṇḍanīti*,¹ and experts therein are referred to as *nītivṛtti* and *nītijña*.²

Although we have a few vague references to republics (*gaṇa*, *saṅgha*³) and their chiefs (*gaṇamukhya*, XV.17; XVII. 24; *gaṇapa*, XXXII.18; *gaṇapati*, XVI.32), there is little doubt that hereditary monarchy was the prevailing form of government. The reference to the king of the Yaudheyas⁴ shows that even avowedly republican peoples had come under the impact of the monarchical form of government. The king was the very soul of the state. It is interesting to note in this connection that some of the topics dealt with in our work are meant particularly for kings. *Antaḥpuracintā* or matters appertaining the royal harem forms an item of the contents of the *Saṁhitā*.⁵ *Indramaha*, *Nīrājana*, *Puṣya-snana* and *Paṭṭa-lakṣana* are other topics that particularly concern the king.⁶ The great importance attached to him is obvious from his description as the root of the subject-tree whose well-being or otherwise depended on the nourishment or injury of the former.⁷ He was expected to secure the welfare of his subjects, and their sufferings were regarded as due to his misdeeds (III.15). He was to mould his character in such a way as to place an ideal before others. Thus a king who

was devoid of right conduct, hot-tempered, malicious, cruel and intent upon hostility was detested and believed to lead his kingdom to ruin. Varāhamihira voices Brāhmaṇical viewpoint when he includes devotion to heretical sects (*pākhaṇḍa*) and atheism among the attributes of a despised king.⁸ His life was full of worries, and carefree moments of leisure were rare indeed. He had to hide his feelings, be ever-ready to fight the enemies, ponder over statecraft involving hundreds of things that have been done or are yet to be done, follow the counsel of ministers and suspect everything; his life was verily an ocean of sufferings.⁹ He had to be constantly alert against danger to his life not only from his enemies but also from ministers,¹⁰ sons¹¹ and queens.¹² To illustrate the last point the author quotes two traditional instances of queens murdering their husbands. Thus Vidūratha, we are told, was slain by his queen with a weapon concealed in the braid of her hair, and Kāśīrāja was killed by the disaffected Devī with her anklet smeared with poison.¹³ This is at variance with the *Arthaśāstra* (I.2.16) and the *Kāmandakīya-nītisāra* (VII.51-54) which aver that Kāśīrāja was murdered by the queen who had mixed fried rice with poison under the pretext of honey, while Vairantya was killed by the queen with her anklet treated with poison. Another source of danger to the king was the rebellion of his own armies.¹⁴ There is yet another reference to the murder of the king by weapons (XXXIV.8).

The king was the centre of all governmental powers. Proper protection of the subjects leading them to prosperity was his primary duty.¹⁵ He was also expected to ensure the welfare of his subjects by performing *śāntis* to ward off portentous occurrences (XLV.3, 17,63). We have also a reference to a king, severe in punishment (*ugra-daṇḍa*, IV.II), who, according to ancient Indian writers on polity, was a source of terror to the subjects.¹⁶

The highest aspiration of an ancient Indian king was to attain supremacy among all the kings (LXIII.1) and the status of a *cakravartin* or universal sovereign (CIV.13) with his suzerainty accepted over the whole earth (*sārvabhauma*, XI.58; *sakalāvaninātha*, LXVIII.18) which, of course, meant India.¹⁷ Thus a king who worshipped Agastya with appropriate ceremonial is promised overlordship of the earth girdled by the seas and victory over his enemies (XII.17). Likewise the sacrificial fire with auspicious signs at the *homa* on the occasion of *Indramaha* is said to bring under the king's authority the earth bounded by the seas, having the rivers Gaṅgā and Yamunā for her necklace; the mythical mountains of sunrise (Udayadharādhara) and sunset (Astadharādhara) for her hips and the Himavat

and the Vindhya for her breasts (XLII.32, 35). This ideal being set before them by all the kings, there were frequent wars.¹⁸ This phenomenon of constant wars was evidently responsible for the well-known *maṇḍala* theory which, according to ancient Indian political thinkers, was the guiding principle of interstate relations.¹⁹ This theory revolves round a king aspiring for conquest (*vijigīṣu*) whom it places in the centre and seeks to define his relations with the neighbours both in the front and the rear. Three constituents of this circle are named by our author: *vijigīṣu* (the would-be conqueror), *ākṛanda* (an ally in the rear whose kingdom is separated from *vijigīṣu*'s by that of another king), *ākṛandasāra* (an ally of *ākṛanda* with their territories separated from one another by that of another king).²⁰ A marching king is referred to as *yāyin*,²¹ while a king against whom it is expedient to march is styled *abhiyojya* (V.84). A king defending his own capital is called *nāgara* and *paura*.²²

Varāhamihira gives us another interesting classification of kings based on their rank in relation to one another. In the ascending order of their status they are (i) *māṇḍalika* or a vassal who bowed at the feet of his suzerain,²³ (ii) *anantarajit* or a conqueror, and (iii) *samastarājyārthin* or one aspiring for overlordship. As we have seen above, they used thrones of varying heights according to their respective status on the occasion of the ceremonial ablution called *Puṣyasnāna*.²⁴

Mention is also made of a frontier-king (*prātyantika*).²⁵

Such great monarchs of the earlier period as the Mauryas, the Śuṅgas and the Sātavāhanas were content with the simple title of *rājan*. But the Guptas rejected this unpretentious style and adopted grandiose titles popularised by foreign rulers of North India. Henceforth *mahārājādhirāja*, which was adapted from the title *mahārāja rājātirāja* known to have been assumed by some Indo-Greek, Scythian, Parthian and Kuṣāṇa rulers, became the characteristic style of paramount monarchs in so far as Northern India was concerned, the titles *rājan* and *mahārāja* being relegated to the feudatory chiefs. It was in keeping with this established practice that our author styles King Dravyavardhana of Avanti *mahārājādhirājaka*.²⁶

The parasol, flag-staff and chowrie were regarded as royal emblems (XVI.23)²⁷

The king was assisted in the discharge of his onerous responsibilities by a large number of officials. In the description of the *paṭṭas*, houses, chowries,

umbrellas and furniture²⁸ we have an indication of the relative ranks of some of the highest dignitaries of the state. Next to the king, these dignitaries in the descending order were: the chief queen, the crown-prince (*yuvarāja*), the commander-in-chief (*senāpati*) and the general (*daṇḍa-nāyaka*).²⁹ Whether the chief queen had to discharge any official functions we have no means to ascertain. But that sometimes she played a very vital role in government is illustrated by the case of the Vākāṭaka queen Prabhāvatiguptā. The commentator describes the *yuvarāja*³⁰ and as a partner in the enjoyment of the kingdom.³¹ The high position occupied by the *yuvarāja* is indicated by some Vaiśālī seals which show that he had his own *kumāramātyas* and military officers.³² The high rank of the *senāpati*, also called *camūpa*, *camūpati*, *camūnātha*, *balamukhya*, *balanāyaka*, *balapati*, *senādhipa* and *senāni*,³³ of the *daṇḍanāyaka*³⁴ was no doubt due to the necessities of wars which appear to have been quite frequent. It is interesting to note in this connection that seals of *senāpatīs* and *daṇḍanāyakas* have been found at Bhita,³⁵ and the *senāpati* frequently figures in the copper-plate charters of the Vākāṭakas in connection with land-grants.³⁶ In our work we do not come across such official designations as the *mahābalādhikṛta* and *mahādaṇḍanāyaka* mentioned in contemporary inscriptions.

The age-old institution of the council of ministers continued to enjoy a respectable status during our period. We have numerous references to ministers called *mantrin*, *amātya*, *saciva*, *nṛpamātra* and *mahāmātya*.³⁷ There is also an allusion to quarrel among the ministers (XVII.4). We are told that the king had to act to the counsel of the ministers (LXXXIII.3). It may be mentioned in this connection that Kāmandaka (IV.41, 44-5; XII.51) also compares the ministers to teachers and friends who prevent the king from going astray and whose advice the king must accept.³⁸

The *purohita*³⁹ or royal priest was another important functionary of the state, his duties being primarily of a religious character. He conducted religious ceremonies for the king on such occasions as *Indramaha*, *Nirājana* and *Puṣya-snāna*.⁴⁰ As we have seen earlier,⁴¹ the *sāmvatsara* (astrologer) was a *sine qua non* of the state in ancient India. Other high functionaries of the state included superintendents (*adhyakṣa*, LII.9) of various departments such as the *karmāntādhyakṣa* (LII.9) or the superintendent of government workshops and manufactories, probably corresponding to the *kārmāntika* of Kauṭilya (I.12.6; II.4.11; V.2.7), and *kośeśa* (CIII.61) or the superintendent of the royal exchequer, officers in charge

of various offices (*ādhikaraṇika*, XXXVIII.2) and other officers (*adhikṛta*, LII.9); *rājādhikṛta*, X.16; *rāja-puruṣa*, LII.14; XCIV.20; *pravara-rāja-puruṣa*, LII.8; *rāja-bhṛta*, X.18; *rājopasevin*, XXXVIII.3; *nṛpānucara*, XIX.3; *nṛpa-sevaka*, C.6). The *kañcukin* (XLII.23) or the officer-in-charge of the royal harem and the royal physician (LII.10) belonged to the personal staff of the king. The envoys (*dūta*)⁴² and spies (*cara*)⁴³ evidently belonged to the foreign office. The *ārakṣaka* (XVI.19) was probably a police officer (*rakṣādhikṛta* according to Utpala). The *kāyastha* was a clerk in the revenue department of the king.⁴⁴

Apart from the *senāpati* and *daṇḍanāyaka* mentioned above, we have references to two other army-officers also: *nāyaka* (XXXV.7) or *netṛ* (LXXXV.34) and *gajādhyakṣa* (LXXXV. 34; LXXXIX.4) The former was probably a commander,⁴⁵ and the latter the chief of the elephant forces. The *turagarakṣa* (XV.26) was probably a cavalry officer.

Forts were of great importance in ancient warfare and as such all ancient Indian writers on polity devote special attention to them. The great value attached to them is evidenced by their inclusion among the seven limbs (*saptāṅgas*) of the state. Varāhamihira refers to three kinds of forts, viz., mountain-fort (*giridurga*, XVI.6.37), water-fort (*saliladurga*, XVI.6) and forest-fort (*āṭavika-durga*,⁴⁶ XVI.12).⁴⁷

Of the four traditional limbs of the army (*caturaṅgabala*), three, viz., infantry, cavalry and elephants, are mentioned by our author.⁴⁸

There is a reference to the encampment of an army on march (*skandhāvāraniveśa*, XCIV.45). We are told that a ground free from ashes, charcoal, bones, sand, husk, hair, pits, burrows of crabs, burrowing animals, rat-holes and ant-hills, hard, sweet-smelling, glossy, sweet and even is suitable for military encampment (XLVII.16-17)⁴⁹.

Military operations were undertaken after the rainy season (XLIII.23). The king often led military expeditions himself. We have a beautiful picture of the commencement of a military march in XLIII.23-6. Profusely decked with a variety of ornaments, with white chowries being waved over him and accompanied by foot-soldiers, horsemen and elephants, the king launched on a military campaign amidst the sounds of musical instruments after the rainy season was over. As observed above, the craze for territorial expansion led to frequent wars. We get references to besieging and capturing towns (VII.19; XII.19; XXX.5, 23). Mention is also made of *niyuddha* or hand-to-hand fight (XV.23; XVI.35).

Varāhamihira affords some valuable information about weapons of war. XLV.19 states that the blazing of a *praharaṇa* forebodes a sanguinary war, while XLV.23 makes the same statement with regard to an *āyudha*. Now, as *praharaṇa* and *āyudha* are generally taken to be synonyms, there is a possibility of duplication to avoid which Utpala cites the authority of Nagnajit's *Citra-lakṣaṇa* which states that *āyudha* is a general term used to denote weapons as a whole⁵⁰ and that *āyudhas* are of three kinds, viz., (i) *praharaṇa* (swords, etc.), (ii) *pāṇi-mukta*, thrown by hand, e.g., wheel, and (iii) *yantra-mukta*, thrown by certain devices, e.g., stones, arrows and sticks. *Āyudha* is thus a general term and *praharaṇa* a kind.⁵¹

Swords

In the *Khaḍga-lakṣaṇa* (Ch.XLIX) section of the *Brhat-saṃhitā* we get some points of absorbing interest about swords (*khaḍga*,⁵² *asi*,⁵³ *nistrimśa*).⁵⁴ A sword measuring fifty *aṅgulas* (3 ft. 1½ inch) in length was considered to be the best while the shortest measured 25 *aṅgulas*⁵⁵ (1 ft. 6¾ inch).⁵⁶ As a general rule a flaw (*vraṇa*) on a spot of the sword corresponding to an odd number of digits was deemed inauspicious, while that on a spot corresponding to an even number, lucky. But flaws shaped like a *bilva* fruit, Vardhamāna figure, umbrella, the *liṅga*, earring, lotus banner, weapon or Svastika were held to be favourable, and those like a lizard, crow, heron, carrion bird, headless trunk, or scorpion, and numerous flaws along the upper edge (*vamśa*) were regarded as ill-ominous. Similarly, a sword that has a cleft, is too short, blunt, broken at the upper edge, unpleasing to eyes and mind, and without resonance even when struck against an object was taken to be unlucky (XLIX.1-4).⁵⁷ It was provided with a hilt (*tsaru*,⁵⁸ XLIX.9) and kept in a scabbard (*kośa*, XLIX.5,10). It was forbidden to unsheath a sword without reason,⁵⁹ rub it, look at one's own face in it, to tell its price or source, take its measure and touch the blade (*asi-yaṣṭi*) without precaution (XLIX.6). In case a wrought sword was too long, the desired length could be obtained by rubbing it against a file (*nikāṣa*), cutting a portion at the upper end or point being forbidden (XLIX.8).

Our author mentions with approval swords fashioned like a cow's tongue, a lotus petal (Fig.44), a bamboo leaf (Fig.45), an oleander leaf⁶⁰ and those with pointed (*śulāgra*, Fig. 46) and rounded (*maṇḍalāgra*, Fig. 47)⁶¹ tips. *Maṇḍalāgra* swords are referred to by Kauṭilya⁶² and Padmagupta⁶³ also. We find such swords represented in sculptures from Sanchi, Bharhut, Amaravati and Nagarjunakonda.⁶⁴

Blood, clarified butter, water and a mixture of the milk of a mare, a she-camel and a cow-elephant were used as imbruements of swords (*śastra-pāna*). A compound of fish bile, deer-milk, horse-milk and goat-milk, blended with palm-resin, was employed for tempering swords. These are said to be based on Uśanas's precepts.⁶⁵ Two other methods of tempering a sword are also given— (1) A sword, first rubbed with gingelly oil, then smeared with an unguent compounded of the milky juice of the calotropis, goat's horn, ink, and dung from doves and mice, well heated in fire, treated with one of the above imbruements, and afterwards whetted (*śita*), it is said, will not get worked on stones,⁶⁶ (2) An iron weapon treated with a stale compound of potash of plantains with butter-milk, and then properly whetted, is said to be so hard as not to break against stones, nor get blunted on other iron objects.⁶⁷

Varāhamihira also refers to poisoned arms (*viṣāyudha*, V.40), bow (*kārmuka*, IV.12; *cāpa*, XXXV.6, 7, 8; LXVIII.29; *bāṇāsana*, XIX.3; *dhanus*, XVIII.5; XX.2; XXXV.1, 5) with its string (*jyā*, IV.12), discus (*cakra*), plough (*hala*), mace (*gadā*), *musala* (XIX.3 LI.17), *vajra* (XX.2; LXVIII.29), various kinds of javelin (*prāsa*, XX.2; *śūla*, LXVIII.29), *śakti* (LXVIII.34), *pāśa*, *paraśvadha* (LXVIII.34), dagger (*kṣuraka*, XXI.15), shield (*khetaka*, LVII.40; LXVIII.22), mail (*varma*, XLI.6) and helmet (*karoti*, LXVII.29).

Rites and sacrifices of a politico religious nature have already been described in Ch.III on Religion and need not be referred to here again.

Notes and References

1. XIX. II. For this term, see *HDS*, III, pp.5 ff.
2. X. 17; XVI. 22. Cf. the titles like *Kāmandakīya nītisāra*, *Śukranītisāra*, *Nītivākyamṛta*, etc. Vide also K.P. Jayaswal, *Hindu Polity*, p.6; A.S. Altekar, *State and Government in Ancient India*, pp.2-3.
3. V.76 refers to the great *gaṇas* (*mahāgaṇāḥ* and the *saṅghas* of the Nīṣādas). Utpala invariably, but wrongly, takes both these words to mean multitude (*samūha*)
4. IX.II. Cf. the Bijayagadh stone inscription referring to the *Mahārāja Mahāsenāpati* of the Yaudheya-*gaṇa* (*CII*, III, No.58). A seal inscription from Haryana refers to two generations of Yaudheya chiefs who styled themselves *Mahārāja Mahākṣatrapa* and *Senāpati*. See Ajay Mitra Shastri, "Note on a Yaudheya Seal," *JNSI*, XXXVI. pp.114-18.
5. II, p. 73. According to the commentator, Chs. 73-77 on the praise of women, the winning of affection, erotic remedies, perfumery and the union of man and woman are included in *antahpurcaintā*.

6. Chs. 71-72 and 78 dealing with umbrellas, chowries and furniture are also mainly intended for the king. The procedure of worshipping Agastya is also particularly described keeping the king in view (XII.13)
7. मूलं मनुजाधिपतिः प्रजातरोस्तदुपघातसंस्कारात् ।
अशुभं शुभं च लोके भवति यतोऽतो नृपतिचिन्ता ॥
XLVII.1
The same idea is voiced in *Matsya-purāṇa*, CCXIX.34
8. पाखण्डानां नास्तिकानां च भक्तः साध्वाचारप्रोज्झितः क्रोधशीलः ।
ईर्ष्युः क्रूरो विग्रहासक्तचेता यस्मिन् राजा तस्य देशस्य नाशः ॥
XLV.75
9. आकारं विनिगूहतां रिपुबलं जेतुं समुत्तिष्ठतां
तन्त्रं चिन्तयतां कृताकृतशयव्यापारशाखाकुलम् ।
मन्त्रिप्रोक्तनिषेविणां क्षितिभुजामाशङ्किनां सर्वतो
दुःखाभ्भोनिधिर्वर्तिनां सुखलवः कान्तासमालिङ्गनम् ॥
LXXIII.3.
10. III.32; XVI.41 For some instances of kings killed by ministers, see *Harṣa-carita*, VI; *Yaśastilaka-campū*, III, pp. 431-32.
11. XVI. 41. For an instance of a king killed by his own son, vide *Arthaśāstra*, I.20, 15-17; for the necessity of king's protection against the princes, vide *ibid.*, I.17.
12. XXIV.34. For several instances of kings killed by or through the stratagems of queens, vide *Arthaśāstra*, I.20. 15-17; *Kāmandakīya-nītisāra*, VII. 51-4; *Harṣa-carita* VI; *Nīṭivākyāmrta*, XXIV. 35-36; K.K. Handiqui, *Yaśastilaka* and *Indian Culture*, pp.104-05.
13. शस्त्रेण वेणीविनिगूहितेन विदूरथं स्वा महिषी जघान ।
विषप्रदिग्धेन च नूपुरेण देवी विरक्ता किल काशिराजम् ॥
LXXXVII.1.
14. *Sua-bala-kṣobha*, V. 26; *antaḥ-kopa*, V.89; *bala-kopa*, XXX.25.
15. XIX. 14. Cf. XIX.9 which refers to the negligence of this duty.
16. *Arthaśāstra*, I. 4.8; *Manu*, VII. 101-103; *Kāmandaka*, VI.15.
17. Also cf. LXVII. 103 (*apratihata-pratāpā jīta-riṣavo mānavendrāḥ*); LXVII.85 (*adhirājy-arthino rājñāḥ*). For the sphere of influence of a *cakravartin* (*cakravarti-kṣetra*), see *HDS*, III, pp.66-7; D.C. Sircar, *Studies in the Geography of Ancient and Mediaeval India*, pp.I ff.
18. III. 30, 32, 35; IV.10, 12; V. 24, 26, 57, 59, 60, 88, 95; VI.8, etc.
19. *Arthaśāstra*, VI; *Manu*, VII. 154-58, 207 ff; *Kāmandaka*, VIII.
20. *Vijigīṣu*:—XV.16; XVI. 38; *ākṛanda*: XVI.7; XVII.6, 7, 8, CIII.6 1/3; *ākṛandasāra*:—XXXIV.22.
21. V.33; XVIII.6, 7, 8; XXX.19; XXXIV.22; XXXV.2
22. *Nāgara*:—XVII.8; XXXIV.22; XXXVI.2; *paura*:—XVII.6-8, 14; XVIII.3; *pura-bhūbhṛt*:—XVIII.6

23. IV.15; XLII. 36., XLVII. 47; LXVIII.23;
24. XLVII.47. For *bhadrāsana* see *supra*, Ch.4, Section VII.
25. LXVIII.23. Utpala is wrong in taking *prātyantika* as the king of the cave-dwellers (*gahvara-vāsinām adhipātiḥ*). Cf. the Allahabad pillar inscription which states that Samudra Gupta made five *pratyanta-nrpatīs* his tributaries. Vide *CII*, III, p.8, 11.22-3.
26. LXXXV. 2. See *supra*, p.440-41.
27. For chowries and umbrellas, see *supra*, pp.230-32.
28. For these items, see *supra*, pp.226-27, 230-32, 240-42, 380-81.
29. This view is based on the measurements of the *paṭṭas*, houses, umbrellas, chowries and couches meant for these dignitaries. However, one cannot be quite certain about the relative rank of the chief queen and the crown-prince. The *paṭṭas* of both had three crests, but the width and length of the queen's was more than that of the crown-prince's. The umbrellas of both were of identical dimensions. But a smaller residence is prescribed for the queen than that for the crown-prince. This may have been due to the fact that the latter required larger accommodation as he actually participated in the administration of the kingdom while the former did not.
30. XXX.19; XXXIV. 10, 20; XXXVI.1; XLII.62; XLVIII.2; LII.17; LXXII.4.
31. *Yuvarājo*=*rdha-rājya-bhāg rājā*, on XXX. 19; *yuvarājo-rdha-bhogī rājā*, on XXXIV 10; *yuvarājāḥ prasiddho-rdha-rājya-bhāk*, on LXXII.4.
32. *ASI, AR*, 1903-04, Nos. 1, 6, 8, 12, pp.107-8; V.R.R.Dikshitar, *Gupta Polity*, pp. 154-56.
33. *Senāpati*:—III. 21; XV.26; XXXIV.10; XXXV. 7; LII.5; LXXII.4; *camūpa*:—X.4; XVI.13; *camūpati*:—L.21; LXVII. 41, 58, 65; *camūnātha* :—XVI.8; XLV.12; LXVII.47; *balamukhya*:—XVII.23; *balanāyaka*:—V.29; *balapati*:—XXIX. 10; XXXIV.13; XXXVI.1; LXXVIII.9; *senādhipa*:—CIII.61; *senānī*:— LXXVIII.20.
34. For the various meanings of this term, see *HDS*, III, pp.985-86; *Dikshitar, op.cit.*, pp.221-22; D.C. Sircar, *Indian Epigraphical Glossary*, pp.80-81.
35. *ASI, AR*, 1911-12, Nos 31, 44-51, pp.52, 55.
36. *CII*, V, pp.29, 43, 58, etc.
37. *Mantrin*:— V.29, 41, 66, 93, etc., *amātya*:—V.41, 69; X.3; XVI.28, etc.; *saciva*:—III.32; IV.25; V.67, etc.; *nrpamātra*:—V. 37 (cf. Utpala:—*nrpamātrā-nrpa-sadṛśā amātyāḥ*); *mahāmātya* is a variant in IX. 28, the other reading being *mahāmātra*, which also, though taken by Utpala to mean elephant-tamers (*hasti-sādhana-patiḥ*, on IX, 28; XV. 11.19; XVI.26), more probably appears to stand for a high government official. See *HDS*, III, pp.998-99.
38. Dikshitar (*op.cit.*, p.113) thinks that the council of ministers exercised control over the king.
39. X.13; XLV.7; LXXXVIII.9; XCIII. 9. For the importance and functions of the *purohita*, vide *Arthaśāstra*, II.9.9-10; *Manu-smṛti*, VII. 78; *Kāmandaka*, IV.31.

40. XLII. 30, 61; XLIII.19; XLVII.3, 18,77. For these ceremonies, see *supra*, Ch.3, Section I.
41. *Supra*, pp.356-58.
42. IX.31; X.10; XVI.18; LII.9, etc. Cf *Arthaśāstra*, I.16; Manu, VII. 63-8; *Kāmandaka*, XIII.1-25.
43. X.10; XVI.18; LXXXV.33;34; LXXXIX.4; XCV.2. For details about spies, see *Arthaśāstra*, I.11-4; *Manu*. VII. 122, 184; *Kāmandaka*, XIII.26-51.
44. p.312, LXXXVI.12.
45. *Kāmandaka*, XIX.45-53; V.R.R. Dikshitar, *op.cit.*, p.223.
46. The commentator, however, takes the words *ātavika* and *durga* as quite independent of one another.
47. For various kinds of forts, *vide Arthaśāstra* II.3; *Manu*, VII.70-71.
48. XIX.3, 14; XLII.34, XLIII.20, 23-26, 28; LXV.1; LXVI.8.
49. For details about *skandhāvāra-niveśa*, *vide Kāmandaka*, XVII.1-22.
50. *Śāstra* is another word used in the same general sense. Cf. IV.21; V.83, 88; VI. 5; XI.4, etc.
51. ननु जलमांसाद्रज्ज्वलने नृपतिवधः प्रहरणे रणो रौद्र इत्यस्य निर्देशस्य आयुधज्वलनसर्पणस्वनाः कोशनिर्गमनवेपनानि वा वैकृतानि यदि वायुधेउपराण्याशु रौद्ररणसङ्कुलं वदेदित्यनेन सह केचिद् द्विरुक्तिं चोदयन्ति यथा यत्प्रहरणज्वलने फलमुक्तं तदेवायुधज्वलने न च प्रहरणानामायुधानां च भेदोऽस्तीति । अत्रोच्यते । नग्नजिता चित्रलक्षणे आयुधानां त्रयो भेदा अभिहिताः । प्रहरणानि, पाणिमुक्तानि यन्त्रमुक्तानि चेति । तत्र प्रहरणनि खड्गादीनि । पाणिमुक्तामि चक्रादीनि । यन्त्रमुक्तामि अश्मशरास्त्रदण्डाश्चेति । योऽयमायुध इति संज्ञा सा सर्वव्यापिनी ।
Utpala on XLV.23.
52. Cf. YY, XII which is a verbatim reproduction of BS, XLIX.
53. XLIX.1, 3, 5, 9; II, p.73; LXVIII.22.
54. VI.5; XIX.3; XLIX.6; LXVII.47; LXVIII.17, 34; XLIX.2; LXXXIX.11.
55. XLIX.10.
56. *Āṅgula-śat-ārdham*= *uttama ūnaḥ syāt pañcaviṃśatiḥ khaḍgaḥ*, XLIX.1. Cf. *Agnipurāṇa*, CXLVIII.5-8); G. Oppert, *On the Weapons, Army Organisation, and Political Maxims of the Ancient Hindus*, pp.24-25.
57. For other beliefs concerning swords and their flaws, of XLIX.5, 9-20; for smell, cf. XLIX.21-2.
58. According to the *Arthaśāstra*, II.18, p.102, handles of swords were made of the horn of rhinoceros, buffalo, of the tusk of an elephant, of wood, or of the root of bamboo.
59. The Gurkhas still observe this practice.
60. Cf. *Medinī*, quoted by Bhānuji on *Amara*, II.4.77, where *karavīra* (oleander) is given as meaning a sword.

Appendix 2

61. गोजिह्वासंस्थानो नीलोत्पलवंशपत्रसदृशश्च ।
करवीरपत्रशूलाग्रमण्डलाग्राः प्रशस्ताः स्युः ॥

XLIX.7.

62. *Arthaśāstra*, II.18, p.102.
63. *Navasāhasāṅkacarita*, I.74.
64. (a) Lotus petal:—

Sivaramamurti, *Amaravati Sculptures*, p. 124, Pl.X, Fig.2; Naik, *Nagarjunakonda Sculptures*, p. 286, fig. 24; N.P. Joshi, *Army & Weapons in Ancient India (Hindi)*, *Bharati*, Bulletin of the College of Indology, Banaras Hindu University, No.3, p.16, Fig.45.

(b) Bamboo-leaf:—

Sivaramamurti, Pl.X, Fig.1.

(c) Oleander leaf:—

Naik, p.288, fig. 27; N.P. Joshi, fig. 47

(d) *Maṇḍalagra*:—

Sivaramamurti, Pl.X, fig. 6; Longhurst, *Nagarjunakonda Sculptures*, Pls. XXX(a), XLIX (b); Naik, p.286, fig. 23; Joshi, fig. 63; Marshall, *Sanchi*, II.Pl.XXXVII (b)

65. इदमौशनसं च शस्त्रपानं रुधिरं श्रियमिच्छतः प्रदीप्तम् ।
हविषा गुणवत्सुताभिलिप्सोः सलिलेनाक्षयमिच्छतश्च वित्तम् ॥
वडवोष्पकरेणुदुग्धपानं यदि पापेन समीहतेऽर्थसिद्धिम् ।
झषपित्तमृगाश्वबस्तदुग्धैः करिहस्तच्छिदये सतालगर्भेः ।

XLIX.23-4.

66. आर्कं पयो हुडुविषाणमपीसमेतं पारावताकुशकृता च युतः प्रलेपः ।
शस्त्रस्य तैलमयितस्य ततोऽस्य पानं पश्चाच्छित्तस्य न शिलासु भवेद्विघातः ॥

XLIX.25.cf. Utpala's comm.

67. क्षारे कदल्या मथितेन युक्ते दिनोषिते पायितमायसं यत् ।
सम्यक् शितं चाशमनि नैति भङ्गं न चान्यलोहेष्वपि तस्य कौण्ड्यम् ॥

XLIX.26.

Appendix 3

Jovian' Cycles of Twelve and Sixty Years

Twelve-year Cycle	487-89
Sixty-year Cycle	489-91
Notes and References	492-94



Two reckonings connected with the movement of Jupiter, one comprising twelve years and the other sixty, were current in ancient India. They are described in Ch. 8 of the *Bṛhat-saṃhitā*.

I. TWELVE-YEAR CYCLE OF JUPITER*

The years of the twelve-year cycle were known after the *nakṣatras* in which Jupiter's heliacal rising¹ takes place between twenty-five to thirty-one days after its conjunction with the sun, in accordance with the order of the lunar months.² There are altogether twenty-seven lunar mansions (*nakṣatras*) beginning with Kṛttikā, and two of them are allotted to each of the twelve years of the Jovian cycle beginning with Kārttika except the fifth, eleventh and twelfth which claim three *nakṣatras* each.³ The following table will explain the mode of determining the names of the years of the twelve-year cycle.

The *nakṣatras* of Jupiter's
heliacal rising

Kṛttikā or Rohiṇī
Mṛgaśīras or Ārdrā
Punarvasu or Tiṣya
Āślesā or Maghā
Pūrvā-Phalgunī, Uttarā-Phalgunī or Hasta

The names of lunar
months given to
Jovian years
Kārttika
Mārgaśīrṣa
Pauṣa
Māgha
Phālguna

*VII.1-14

Citrā or Svāti	Caitra
Viśākhā or Anurādhā	Vaiśākha
Jyeṣṭhā or Mūla	Jyaiṣṭha
Pūrvāṣādhā or Uttarāṣādhā	Āṣādhā
Śravaṇa or Dhaniṣṭha	Śrāvaṇa
Śatabhiṣaj, Pūrva-Bhadrapadā, or Uttara-Bhadrapadā	Bhādrapada
Revatī, Aśvinī or Bharanī	Āśvayuja

The interval between two heliacal reappearances of Jupiter is about 399 days. And since in twelve solar years Jupiter rises heliacally only eleven times, in each cycle of the heliacal rising system there are only eleven *saṃvatsa-as* in twelve solar years, and one of the twelve *saṃvatsaras* of the cycle is treated as expunged.

Another system of determining the names of the *saṃvatsaras* of the twelve-year cycle of Jupiter is given by Āryabhaṭa⁴ and Brahmagupta.⁵ It is known as the mean-sign system. But as shown by S.B. Dikshit, the heliacal rising system is advocated not only by Varāhamihira but by several other authorities also, viz., Parāśara, Garga, Ṛṣiputra, Vasiṣṭha, Atri, Bṛhaspati, the *Nārada-saṃhitā*, the *Muhūrta-tattva*, the *Jyotiṣa-darpaṇa* and the *Sūrya-siddhānta*.⁶ This shows the higher antiquity and greater popularity of the heliacal rising system as compared to the mean-sign system enunciated by Āryabhaṭa and Brahmagupta.

The *saṃvatsaras* of the twelve-year cycle of Jupiter are referred to in several inscriptions dating from the fifth to about the end of the seventh century AD. The names of the years are sometimes prefixed by the word *mahat*. So far as the epigraphical evidence is concerned, this feature is to be noticed only in the records belonging to Central India, Rajasthan and Orissa.⁷ Two records of the Kadamba king Mṛgeśavarman (AD c.475-490) belonging to his 3rd and 8th regnal years are dated in the Pauṣa and Vaiśākha *saṃvatsaras* respectively.⁸ The Pāṇḍaraṅgapallī grant of the 15th year of the Avidheya, the Rāṣṭrakūṭa king of Mānapura, is dated in the Bhādrapada *saṃvatsara*.⁹ The earliest mention of a *saṃvatsara* of Jupiter's twelve-year cycle in North India is to be found in the Khoh plate of the Parivrājaka Mahārāja Hastin, dated in the Gupta year 156 (AD 475-476) corresponding to the Mahā-Vaiśākha *saṃvatsara*.¹⁰ Another Khoh copper-plate charter (dated Gupta 163 [AD 482-483], Mah-Āśvayuja *saṃvatsara*)¹¹ and the Majhgavan plates (dated Gupta 191 [AD 510-511], Mahā-Caitra *saṃvatsara*) of Hastin,¹² the Bhumara pillar inscription of Hastin and the Uccakalpa chief Śarvanātha (dated in the Mahā-Māgha *saṃvatsara*),¹³ and the Khoh plates of the

Parivrājaka *Mahārāja* Saṅkṣobha (dated Gupta 209 [AD 528-529], Mah-Āśvayuja *saṁvatsara*)¹⁴ also refer to the cyclic years. The years of the twelve-year cycle are not mentioned in South Indian records after the sixth century A.D.¹⁵ In North India the cycle continued to be in vogue for some time more. The Dhulev plate of *Mahārāja* Bhatti, dated in the year 73,¹⁶ variously assigned to the Bhāṭika or Harṣa era (AD 696 or 679-80)¹⁷ is the latest known record to mention a year (Āśvayuja) of the Jovian cycle of twelve years. The reckoning is now almost obsolete and is sometimes mentioned in the alamanacs only.

II

SIXTY-YEAR CYCLE OF JUPITER*

The years of the Jovian cycle of sixty years are invariably referred to by their respective names and not by numbers as in the case of other reckonings. A Jovian year is the period of Jupiter's stay in a particular sign of the zodiac with reference to his mean motion. A *Bārhaspatya saṁvatsara* comprises about 361.026721 days and is thus shorter than the solar year by about 4.232 days. Consequently in every period of about 85 years a Jovian year is expunged. When two years of Jupiter begin during the same solar year, the first is regarded as omitted.¹⁸

The following are the names of the sixty *saṁvatsaras* of the Cycle: (1) Prabhava, (2) Vibhava, (3) Śukla, (4) Pramoda, (5) Prajāpati, (6) Aṅgiras, (7) Śrīmukha, (8) Bhava, (9) Yuvā, (10) Sudhāṭr, (11) Isvara, (12) Bahudhānya, (13) Pramāthin, (14) Vikrama (15) Vṛṣa, (16) Citrabhānu, (17) Subhānu (18) Nata,¹⁹ (19) Tāraṇa, (20) Vyaya (21) Sarvajita, (22) Sarvadhārin, (23) Virodhin, (24) Vikṛta, (25) Khara, (26) Nandana, (27) Vijaya, (28) Jaya. (29) Manmatha, (30) Durmukha, (31) Hemalamba, (32) Vilambin, (33) Vikārin, (34) Śarvarī, (35) Plava, (36) Śokahr̥t²⁰ (37) Śubhahr̥t²¹, (38) Krodhin, (39) Viśvāvasu, (40) Parābhava, (41) Plavaṅga, (42) Kīlaka, (43) Saumya, (44) Sādhāraṇa, (45) Rodhahr̥t,²² (46) Paridhāvin, (47) Pramādin, (48) Vikrama²³, (49) Rākṣasa, (50) Anala, (51) Piṅgala, (52) Kālayukta, (53) Sidhārtha, (54) Raudra, (55) Durmati, (56) Dundubhi, (57) Aṅgāra,²⁵ (58) Raktākṣa, (59) Krodha, (60) Kṣaya (VIII.27-52).

These sixty years were classified into twelve *yugas* of five years each, the *yugas* being known after their respective presiding divinities, viz., (1) Viṣṇu, (2) Surejya,

*VIII. 20-52.

(3) Balabhid, (4) Hutāśa, (5) Tvaṣṭr, (6) Ahirbudhnya, (7) Pitṛ, (8) Viśva, (9) Soma, (10) Śakrānala, (11) Aśvins and (12) Bhaga. The five years of these *yugas* known as (1) Saṁvatsara, (2) Parivatsara, (3) Idāvatsara, (4) Anuvatsara and (5) Idvatsara were believed to be presided over by Agni, the Sun, the Moon, Prajāpati and the spouse of the daughter of the mountain, i.e., Śiva, respectively (VIII.24). It was believed that there would be good rainfall in the first year of a *yuga*, rain only in the first half of the rainy season in the second year, excessive rain in the third year, rain only in the latter half of the season in the fourth year and scanty rain in the fifth year (VIII.25). Of the twelve *yugas*, the first four were regarded as very auspicious, the next four as middling and the last four as the worst (VIII.26). The auspicious and inauspicious happenings of all the sixty years of the reckoning are described at length (VIII.27-52).

According to Varāhamihira (VIII.27), Prabhava, the first year of the Cycle, begins when Jupiter reappears after his conjunction with the sun having reached the first quarter of the *nakṣatra* Dhaniṣṭhā in the month of Māgha.

Varāhamihira gives the following rule for finding out the Jovian year. Multiply the number of expired Śaka years by 44 and add to the product 8589 and divide the result by 3750. Add to the quotient the number of expired Śaka years. Divide the sum by 60. The remainder will be the serial number of the expired Jovian *saṁvatsara* beginning with Prabhava at the beginning of a given Śaka year (expired). The same divided by 5 gives the *yuga* and the remainder denotes the number of *saṁvatsaras* elapsed in a particular *yuga*.²⁵

According to this rule, the expired Jovian *saṁvatsara* at the beginning of Śaka 1890 (expired) would be the 54th year Raudra, the current year being Durmati ($1890 \times 44 = 83160$, $83160 + 8589 = 91749$, $91749 \div 3750 = 24$, $24 + 1890 = 1914$, $1914 \div 60 = 31$, remainder 54 (Raudra), the following year (Durmati) would be the current *saṁvatsara*). The current *yuga* is the 11th presided over by Aśvins; the first four years of the *yuga* have elapsed, the fifth one (Durmati) being current ($54 \div 5 = 10$ (the number of elapsed *yugas*), remainder 4, which is the number of the years elapsed in the current (11th) *yuga*).

In order to find out the *nakṣatra* in which Jupiter is situated in a particular *saṁvatsara* Varāhamihira asks us to multiply the number of expired Jovian years found out by the above method by 9 and to divide the same by 12 and then to add the product and the quotient and lastly to divide the result by 4. The

quotient yields the particular lunar mansion beginning with Dhaniṣṭhā and the remainder the *pādas* in the next *nakṣatra* already traversed by Jupiter.²⁶

In North India Jupiter's year theoretically commences with Jupiter's entry into a particular zodiacal sign, but in practice it is counted from Caitra śukla 1. Originally there was no difference between the Northern and Southern systems of the 60-year Jovian cycle. But later on in South India the distinction between the Jovian and solar years was ignored and consequently a southern Jovian year is the same as a solar year and there is no suppression of a *saṃvatsara* in a period of 85 or 86 years as is the case with the Northern or true system. It has no connection with the movement of Jupiter, and Pramāthin is regarded as the first year of Kaliyuga as against Vijaya in the Northern system.

According to S.B. Dikshit, the true cycle of Jupiter was in vogue in South India before Śaka 828 (AD 905-6), but from that year according to the *Ārya-siddhānta*, or from Śaka 831 (AD 908-9) according to the *Sūrya-siddhānta*, the expunction of the *saṃvatsaras* was altogether neglected, with the result that the 60-year cycle in the South became luni-solar from that year. At present the northern *saṃvatsara* has advanced by 12 years over the southern one.²⁷

To find out the Jovian *saṃvatsara* according to the Southern luni-solar system one has to add 12 to the number of expired Śaka years and divide it by 60, the remainder being the number of the current year of the reckoning beginning with Prabhava. According to another rule, one has to add 12 to the number of expired Kali years and then to divide the sum by 60, the remainder being the number of expired cyclic year beginning with Prabhava.²⁸

The 60-year cycle is rather rarely employed in North Indian inscriptions, but in South India it is in daily use even to this day. The Mahākūṭa pillar inscription of the Cālukya king Maṅgaleśa dated in the Siddhārtha year²⁹ is regarded as the earliest genuine record referring to a year of the 60-year cycle of Jupiter. According to some scholars, however, the use of the 60-year cycle at a much earlier date is attested by two Nagarjunakonda inscriptions of the Ikṣvāku kings Virapuruṣadatta and his son and successor Ehuṇḍa Śāntamūla (late third-early fourth century AD).³⁰ In that case the view of Burgess that the years of the Jovian cycle, were first introduced about AD 349³¹ needs to be substantially modified.

Notes and References

1. The heliacal rising of a superior planet is its first visible rising after its conjunction with the sun, i.e. when it is at sufficient distance from the sun to be first seen on the horizon at its rising in the morning before sunrise, or in the case of an inferior planet, e.g., Mercury or Venus, at its rising in the evening after sunset. For Jupiter to be visible the sun must be about 11° below the horizon. *Vide* R. Sewell and S.B. Dikshit, *Indian Calendar*, p.37, note 2.

2. नक्षत्रेण सहोदयमुपगच्छति येन देवपतिमन्त्री।
तत्संज्ञं वक्तव्यं वर्षं मासक्रमेणैव॥

VIII.1.

3. वर्षाणि कार्तिकादीन्याग्नेयाद् भद्रयानुयोगीनि।
क्रमशस्त्रिभं तु पञ्चममुपान्त्यमन्त्यं च यद् वर्षम्॥

VIII.2.

While commenting on this verse, Utpala takes 'antya' to mean 'last', 'concluding' and states that the fifth (Phālguna), eleventh (upāntya, Bhādrapada) and twelfth (antya, Āśvayuja) years of the Jovian cycle comprise three *naksatras* each:—
पञ्चमं फाल्गुनं वर्षं त्रिभं नक्षत्रयानुयोगीनि। अन्त्यं द्वादशं चाश्वयुजं त्रिभं तस्य समीपमुपान्त्यमित्येकादशं च त्रिभम्। एवं पञ्चममुपान्त्यमन्त्यं वर्षत्रयं त्रिभम्।

But according to another interpretation sought to be supported by Garga, Parāśara and Kāśyapa, 'antya' should be taken to mean 'near', not 'last'. Thus the fifth, eleventh (upāntya) and tenth (antya) consist of three *naksatras* each:-

अत्रान्य एवं व्याचक्षते यथोपान्त्यमन्त्यं चेत्यत्रान्त्यशब्दः समीपवाची। उपान्त्यस्यैकादशस्य समीपं दशमं श्रावणं न तु द्वादशमाश्वयुजमिति।

However, the correctness of Utpala's interpretation is clearly demonstrated by the following stanza of the *Samāsa-saṃhitā* of Varāhamihira:-

गुरुदयति नक्षत्रे यस्मिंस्तत्संज्ञितानि वर्षाणि।
द्विभयोगीन्याग्नेयात् त्रिभमन्त्यं पञ्चममुपान्त्यम्।

4. *Āryabhaṭīya*, Kālakriyāpāda 4.
5. *Brāhamasphuṭasiddhānta*, XIII.42
6. *CII*, III, Introduction, pp.170-71.
7. The prefix *mahat* is employed by Utpala also in his commentary on VIII. 1, p.182.
8. *IA*, VII, p.35; VI, p.24.
9. *EI*, XXXVII, p.22, text-line 28.
10. *CII*, III, p.95, text-lines 1-2. D.C. Sircar's statement that the earliest occurrence of the reckoning in North is traceable in *Mahārāja* Hastin's Khoh copper-plate grant dated in the Gupta year AD 163=482-83 (*Indian Epigraphy*, p.280) is obviously due to oversight.
11. *CII*, III, p.102, text-lines 1-2.
12. *Ibid.*, p. 107, text-lines 1-2.

13. *Ibid.*, p.111, text-lines 7-8.
14. *Ibid.*, III, p. 114, text-lines 1-2.
15. *El*, XXXVII, p.15. The latest reference to this reckoning in the Deccan is to be noticed in the Siripuram plates of the Gaṅga king Anantavarman, dated in the Mah-Āśvayuja *saṃvatsara* (*ibid.*, XXIV p.51, text-line 13)
16. *El*, XXX, p.4, text-line 5.
17. *Ibid.*, pp.3, 7; *IHQ*, XXVIII, pp.342 ff. D.C. Sircar, *The Guhilas of Kīṣkindhā*, pp. 47-48. A stone inscription found at Kot in the Bharatpur State is dated in the Mah-Āśvayuja *saṃvatsara*. Vide G.H. Ojha, *Bhāratiya Prācīna Lipimālā*, p. 187, note. 3.
18. R.Sewell and S.B. Dikshit, *Indian Calendar*, p.33, For a list of expunged *saṃvatsaras* according to Varāhamihira from Śaka 232 (current) to Śaka 999 (current), see *ibid.*, p.36.
19. As pointed out by Sudhakara Dvivedi (*BS* with Utpala's commentary, p. 201 n.), in the popular astrological works the name of this cyclic year is given as Pārthiva, and consequently modern scholars replace *na tacca* for *nataṃ ca* of the original (VIII.35).
20. Now-a-days it is commonly known as Śubhakṛt. Śokakṛt is a variant for Śokahṛt. Vide *BS*, p.203, notes 1-2.
21. Now it is popularly called Śobhakṛt. Vide *ibid.*, note 1.
22. Now commonly known as Virodhin. *Ibid.*, p. 204 note.
23. In all the popular astrological treatises, it is called Ānanda Consequently modern scholars read *Pramādy-ath=Ānandam=atah- parom yat* in place of *Pramādinam Vikramam=apy=ato=nyat=* in verse 45 and *tatparaḥ* in place of *Vikramah*, at the beginning of verse 47. *Ibid.*, p. 205 note.
24. Now it is generally called Rudhiredgārin and therefore some scholars read *Udgāri-saṅjñam* in place of *Āngāra-saṅjñam* in the beginning of verse 50. *Ibid.*, p.207, note.
25. गतानि वर्षाणि शकेन्द्रकालाद्धतानि रुद्रैर्गुणयेच्चतुर्भिः ।
नवाष्टपञ्चाष्ट ८५८६ युतानि कृत्वा विभाजयेच्छून्यशरागरामैः ३७५० ॥
लब्धेन युक्तं शकभूपकालं संशोध्य षष्ट्या विषयैर्विभज्य ।
युगानि नारायणपूर्वकाणि लब्धानि शेषाः क्रमशः समाः स्युः ॥
VIII.20-21
26. एकैकमब्देषु नवाहतेषु दत्त्वा पृथग् द्वादशकं क्रमेण ॥
हत्वा चतुर्भिर्वसुदेवताद्यान्युद्भिनि शेषांशकपूर्वमब्दम् ॥
VIII.22.
27. Sewell and Dikshit, *op.cit.*, p.37.
28. G.H. Ojha, *l.c.*, p. 188 and note 3.
29. *IA*, XIX, p.18.
30. *El*, XXXV, pp.1ff; *JOR*, XXIX, pp.41ff. But *contra El*, XXXVII, pp.70 ff.
31. Sewell and Dikshit, *l.c.*, p.36.

Appendix 4

Rainfall in Ancient India : Textual Evidence

Sources of Study	495-496
Pregnancy of Clouds (<i>Garbha-lakṣaṇa</i>)	496-499
Means of Ascertaining Future Rainfall	499-502
Signs of Immediate Rainfall	502
Classification of Clouds	502-503
Measurement of Rains	503-506
Notes and References	506-508



Some seven decades ago Ganganath Jha invited the attention of Indologists to the great importance of studying ancient Indian meteorology and called upon the younger generation of scholars to take to the task of elucidating it (*Allahabad University Studies*, Vol. I (1925), pp.I-II). In spite of a gap of about seventy years, however, the subject still offers a virgin field for study. Here is an humble attempt to fulfil this long-felt need by recording and analysing some textual evidence bearing on rainfall in ancient India.

Sources of Study

In an agricultural economy like that of India the importance of proper rainfall can hardly be exaggerated,¹ and it is quite reasonable to expect ancient Indian authors to have made observations on the climatic conditions of their country. And it is indeed gratifying to note that such observations were really made and recorded. The *Brhatsamhitā* of Varāhamihira abounds in references to the views

of Garga, Parāśara, Vajra, Kaśyapa, Bādarāyaṇa, Asita-devala (or Asita and Devala) and others bearing on rainfall. Unfortunately all these works, with a very few exceptions (e.g. fragments of *Gārgīśamhitā*), are no more extant. But Bhaṭṭotpala in his commentary on the *Brhatsamhitā* entitled *Vivṛti* quotes from these authors as well as from Siddhasena, indicating thereby that works ascribed to these personages were still available in the ninth century AD. Among the extant texts, the most exhaustive treatment of the subject is to be found in chapters XXI-XXVIII of the *Brhatsamhitā*.² Extracts from earlier works in Bhaṭṭotpala's commentary are equally useful. The *Kṛṣi-Parāśara*, also known as *Kṛṣi-saṅgraha* or *Kṛṣi-paddhati*, a work on agriculture and matters related thereto, devotes considerable space to prediction about rainfall and its measurement, etc.³ The four Mss. of the *Meghamālā*, now preserved in the Bhandarkar Oriental Research Institute, Poona, are exclusively devoted to this subject.⁴ Apart from these texts, accidental references occur in works dealing with other subjects, e.g., the *Rgveda*, Pāṇini's *Aṣṭādhyāyī*, Kauṭilya's *Arthaśāstra*, Meghadūta, Kalhaṇa's *Rājatarāṅgiṇī*, etc. The following account of ancient Indian meteorology is mainly based on these works.

Pregnancy of Clouds (Garbha-lakṣaṇa)

According to the beliefs current in those times the process of the formation of clouds commenced six months and a half before rains actually came: in the ornate style of the age clouds conceive (*garbha*) in autumn-winter and give birth (*prasava*) to rain 195 days (six and a half months) later. This belief seems to be as old as the *Rgveda*. Most probably *Rgveda* I.6-4 contains a reference to the formation of rain embryos and Sāyaṇa aptly interprets the verse "*Ādaha svadhām=anu punar=garbhatvam=erire dadhānā nāma yajñīyam*" by "*megha-madhye jalasya garbh-ākāram preritavantah*" (cf. *JRAS*, N.S., 1871, p.251, fn.2). Meteorologists differed very widely as to the time when the formation of rain-embryos actually begins. It was held by some that the clouds begin to conceive after the bright half of the month of Kārttika (October-November): *Kecid=vadanti munayah Kārttika-śukl āntam=atītya garbha-divasāḥ syuḥ* (BS, XXI.5). Utpala also quotes a verse from Siddhasena to this effect;⁵ the *Meghamālā* similarly describes the formation of rain-foetuses in Kārttika (Ms.No.844 of 1884-87, New No.24, folio 13, vv.13ff). But this was not the majority view—*na ca tan=mataṁ bahūnām* (BS, XXI.5): according to Garga (and Utpala adds), Vasiṣṭha, Parāśara, Ṛṣiputra and Kaśyapa marks of the pregnancy of clouds could be detected from the first day

of the bright half of Mārgaśīrṣa (November-December) onwards when the moon enters Pūrvāṣādhā (BS, XXI.6). The foetuses thus formed give birth to rains 195 days later (after six months and a half) when moon is in conjunction with the same asterism as that when conception takes place.⁶ The clouds formed in the bright half rain in the dark half and *vice versa*; those formed during the day bear fruit during the night and *vice versa*; and those formed in the east pour water in the west and *vice versa*; those conceived at dawn bring rain in the evening and *vice versa*; so on and so forth.⁷ The clouds conceived in the beginning of Mārgaśīrṣa and in the bright half of the month of Pauṣa (December-January) give but little rain.⁸ The following chart will show the months and fortnights of the formation of rain-embryos and their delivery respectively (BS, XXI. 9-12, and Garga quoted by Bhaṭṭotpala):

<i>Conception</i>	<i>Delivery</i>
Pauṣa kṛṣṇa (dark half)	Śrāvaṇa śukla (bright half)
Māgha śukla	Śrāvaṇa kṛṣṇa
Māgha kṛṣṇa	Bhādrapada śukla
Phālguna śukla	Bhādrapada kṛṣṇa
Phālguna kṛṣṇa	Āśvina śukla
Caitra śukla	Āśvina kṛṣṇa
Caitra kṛṣṇa	Kārttika śukla ⁹

The following are some of the auspicious marks tending to nourish rain-foetuses:—pleasant, soft, northerly, north-easterly or easterly wind; clean sky; moon and sun covered by glossy, bright and thick halo; sky overcast with large dense, smooth, needle-like or razor-shaped red, black or blue clouds and bright moon and other stars; morning or evening (*pūrvā*-or *apara-sandhyā*) accompanied by rainbow, rumbling of thunder, lightning and appearance of mock-sun; birds and animals with pleasant sounds in the north, north-east or east; large, soft-rayed and unhurt planets moving in the *pradakṣiṇa* order (to the north of asterism); trees with their sprouts unhurt; men and quadrupeds happy (BS, XXI.14-18, Cf. Parāśara quoted by Utpala). Clouds resembling pearls or silver or having complexion of *tamata*, lotus or collyrium and of the shape of aquatic animals foretell profuse rain; those scorched by fierce rays of the sun and accompanied by soft breeze pour excessive water at the time of delivery (*prasava-kāla*)¹⁰ Next are enumerated symptoms appearing in particular months which tend to nourish

rain-embryos:—

<i>Mārgaśīrṣa</i> (Nov.Dec.)	absence of severe cold	}	red glow of horizon in morning and evening, and clouds accom- panied by haloes.
<i>Pauṣa</i> (Dec. Jan.)	absence of thick frost		

Māgha (Jan.Feb.)—strong winds, sun and moon with their light obscured by frost, too much cold, appearance of clouds at sunrise and sunset.

Phālguna (Feb. March)—rough and violent gale, glossy and floating clouds, incomplete haloes round sun and moon, tawny or coppery sun.

Caitra (March-April)—wind, clouds, rain and haloes.

Vaiśākha (April-May)—clouds, winds, rain, lightning and thunder.¹¹

The following signs indicate a miscarriage of rain-embryos and tend to destroy all chances of rain foreseen from the phenomena described above:— fall of meteors, lightning, dust-storm, burning of the quarters (*digdāha*), earthquake, clouds having the appearance of cities, comets, planetary conflicts, thunder, marks of blood, oil, ghee, etc. (Utpala—*rudhir-ādi-vaikṛtaṃ vikāraḥ rakta-māmsa-vasā-ghṛta-tail-ādi-varṣaṇam*) in rain-water, rainbow and appearance of Rāhu as well as the other three portents, viz., celestial, atmospheric and terrestrial (cf. Parāśara quoted by Utpala on *BS*, XXI.25-26:—*tathā ca Parāśarah, teṣāṃ garhāṇām=uday-āstamay-olkā-nirghāt-āsani-pāta-gandharva-nagara-digdāh-ārka-raśmi-varṇa-vikāra-bhū-calana-prādurbhāvo varṣāsu=abhāvāya*). Utpala tells us that if any of these phenomena appear immediately after the formation of rain-embryos, then there is little chance of resultant rainfall (on *BS*, XXI.26—*etad=uktaṃ bhavati, garbhe dṛṣṭe yadi paścād=uktānān=anyatamo bhavati tadā garbho hato yasya samanantaram paścād=utpāta-sambhavo n-ānya iti*). Besides, the signs just reverse of those general and special phenomena indicative of rainfall, described above, minimise chances of rain.¹²

It is further observed that the cloud-foetuses formed in any of the six months from *Mārgaśīrṣa* to *Vaiśākha* when the moon enters any of the five asterisms, viz., *Pūrva*- and *Uttara-Bhadrapadā*, *Pūrva*- and *Uttarāṣādhā* and *Rohiṇī*, give profuse rain; an embryo formed in any month in the asterisms *Śatabhiṣaj* or *Āśleṣā* or *Ārdṛā* or *Svāti* or *Maghā* develops and rains for many days, whereas the foetuses destroyed by the celestial, atmospheric and terrestrial portents indicate absence of rain for those very days¹³; that formed in *Mārgaśīrṣa*

(Nov.Dec.) rains for eight days; that in Pauṣa (Dec.-Jan.) for six days; that in Māgha (Jan.-Feb.) for sixteen days; that in Phālguna (Feb. March) for twenty—four days; that in Caitra (March-April) for twenty days; and that in Vaiśākha (April-May) for three days only.¹⁴ A rain-embryo accompanied by all the five concomitants, viz., wind, water, lightning, thunder and cloud, rains profusely over an expanse of one hundred *yojanas*; that accompanied by four phenomena over fifty *yojanas*; that having only three phenomena rains over an area of twenty-five *yojanas*; one accompanied by two over twelve *yojanas* and a half; and that by one only over five *yojanas*.¹⁵ (cf. *Meghadūta*, I.5—*Dhūmajyotiḥ-salila-marutām sannipātaḥ kva meghaḥ*, where four of the five concomitants are enumerated); but too much rain at the time of the conception tends to its destruction (*BS*, XXI.34) and produced a drizzle at the time of delivery (*ibid.*, XXI.37). If, however, a fully developed rain-embryo does not deliver rain at its proper time after one hundred and ninety-five days, it gives hail-stones at the time of second conception, for, like cow-milk kept for a long time, water also becomes hard after crossing its time.¹⁶

The four days commencing with the 8th of the bright half of Jyēṣṭha (May-June) are regarded as retainers of wind (*vāyudhāraṇā divasāḥ*) and these accompanied by soft, northerly or southerly or easterly wind as also glossy clouds favour good rain; whereas a rain in the same month and fortnight (*Jyēṣṭha śukla*) in the four asterisms, viz., Svāti, Viśākhā, Anurādhā, and Jyēṣṭhā, indicates absence of rain in Śrāvaṇa (July-August), Bhādrapada (Aug.-September), Āśvayuja (Sept.-October) and Kārttika (October-November) respectively (*BS*, XXII.1-3).

According to Kauṭilya, a forecast of rainfall could be made by observing the position, motion and pregnancy of Jupiter, the rise and setting and motion of Venus, and the natural or unnatural aspect of the sun (*Arthasāstra*, II. 24. 7-8).

Means of ascertaining Future Rainfall

Prospects of future rainfall could be foreseen by a careful observation in the dark half of Āṣāḍha of the size, brightness, colour, direction, etc. of the moon when in conjunction with Rohiṇī. For this purpose a Brahmin astrologer went to a place north or east of the town or village; stayed there for three days observing fast and worshipping sacred fire; drew figures of planets and asterisms on the ground and worshipped them with oblations coupled with incense and flowers;

sanctified all types of seeds with the Mahāvratā hymns and finally immersed them in water containing gold and *kuśa* grass in a pot. Only those of the seeds and their parts which get sprouted during the moon's conjunction with Rohiṇī may be expected to thrive during the year and not others (BS, XXIV. 4-8, 11). Water-pots already kept in the north, east, south and west were regarded as indicative of rainfall in Śrāvaṇa, Bhādrapada, Āśvayuja, and Kārttika respectively; full jars foretold good rain; while half-filled and empty ones moderate rain and drought in the months represented by them.¹⁷

Similarly, pots bearing names of kings, countries and different castes foretold their future prospects (BS, XXIV.27). Besides, the direction of the future rainfall could be determined by carefully observing the course of wind by means of a black flag four cubits in length and hoisted on a staff twelve cubits in height at the time of the moon's conjunction with Rohiṇī: for this purpose four watches (3-hour periods) of the day were regarded as representing four months beginning with Śrāvaṇa respectively; and parts thereof corresponded to the days in their respective months.¹⁸ In case the wind blows simultaneously from two directions, that which shows more firmness should be taken into account. The *Kṛṣi-Parāśara* (verse 34) also prescribes the use of a flag for ascertaining the course of the wind. It shows, as pointed out by S.P. Raychaudhury (*Agricultural Practices in Ancient India*, p. 31, fn. 2), the use of weather-vanes in those days. In this connection the colour, size, etc., of the clouds were also carefully observed and these features are described at length (BS, XXIV. 12-25). Similar observations were made at the moon's conjunction with the asterism Svāti in the bright half of the month of Āṣāḍha (May-June): a rain in the (i) first, (ii) second and (iii) third watches of the night indicated the abundance of (i) all crops, (ii) sesamum, green gram and black gram, and of (iii) summer crops respectively. Similarly, rain in the (i) first, (ii) second, (iii) third part of, and (iv) for the whole day indicated (i) good rain, (ii) rain coupled with insects and snakes, (iii) moderate rain, and (iv) timely rains respectively. If there are snowfall, strong and speedy winds, continuous thunder and lightning at the moon's conjunction with Svāti on the seventh day of the dark half of Māgha, good rains and rich crops may be expected (BS, XXV).

Another method of ascertaining future prospects of rainfall and crops was to keep sanctified seeds of all types in equal quantities for the whole night of the full moon of Āṣāḍha: such of the seeds as showed an increase in weight

would thrive, while those that diminish would not flourish; and such as neither increase nor decrease would thrive moderately (*BS*, XXVI.1, 10. For the method of preparing the balance for weighing the seeds see, *ibid*, XXVI.6-9).

The *Kṛṣi-Parāśara* gives detailed rules for determining the ruler and the minister of the year in question and their influence on rainfall involving astrological matters which need not be detailed here. An interesting method of determining the quantity of rainfall for the whole of the forthcoming year as found in the *Kṛṣi-Parāśara* is as follows: The whole of the month of Pauṣa is to be divided into twelve equal parts, each consisting of two days and a half and representing the twelve months of the year commencing with Pauṣa. The course of wind ascertained by means of a flag during these twelve parts of Pauṣa foretold rainfall in the months represented by these parts: the wind blowing from the north or from the west in any of the above-mentioned parts of Pauṣa is indicative of good rainfall in the months thus represented, whereas that blowing from the east or south foretells scanty rain; if, on the other hand, wind does not blow in a definite direction, it would not rain at all, whilst the wind blowing at random indicates irregular rainfall. Every five *daṇḍas* (24 minutes) of Pauṣa correspond to a day of a month: the rainfall in the first half of this 5-*daṇḍa* period indicates rainfall in the daytime, whilst that in its latter half foretells rainfall in the night; so on and so forth (verses 12-23, 31-34). A shower accompanied by thunder-storm or lightning on the seventh day of the bright half of Māgha (Jan.-February) and Phālguna (Feb.-March) or the third day of the full moon in Caitra (March-April) or Vaiśākha (April-May) foreshows good rainfall and abundance of crops in that year (verses 39-40).

According to another peculiar method, in the first night of the bright half of Vaiśākha one was required to write the words "Let there be success" (*siddhir=astu*) on a rod two hundred times, and then to erect that rod on the bed of a flowing river, dipping it up to the written mark in the water and finally to mark the next morning where the water level stands: unchanged water level indicates that the rainfall during that year will be the same as that in the preceding year; if the water-level goes up or down it indicates a rainfall more or less than that of the previous year; the water level rising above the marked spot on the rod foreshows double rainfall and flood (verses 45-49).

The course of wind on the full-moon day of Āṣāḍha was to be observed carefully for ascertaining the nature of rainfall (verses 56-57). A shower or the absence

thereof on the seventh day of the bright half of Āṣāḍha indicates good rainfall or drought throughout the year (verse 38).

Signs of Immediate Rainfall

The *Bṛhat-saṃhitā*, the *Kṛṣi-Parāśara* and other works under consideration describe at length the signs that were believed to indicate an immediate rainfall. Many of these beliefs are still current in different parts of India. Some of these phenomena are mentioned below:—the sun with dazzling brilliance and burning with intense heat at the zenith of the sky; tasteless water; sky having the complexion of a cow's eye; uncontaminated directions; moisture of salt; absence of wind; fishes coming to the banks; repeated croakings of frogs; cats scratching the earth with their nails; accumulation of rust on iron; construction of bridges on the streets by children; mountains appearing like heaps of collyrium; haloes of the colour of a cock's eye round the moon; ants shifting their eggs without any apparent cause; cows looking above at the sun; reluctance of domestic animals to go out of the house and their shaking ears and hoofs; dogs barking continuously looking at the sky; lightning flashing from the north-east during the daytime; appearance of mock sun and moon; cool breeze blowing from the east (*BS*, Ch. XXVIII:—*sadyovarṣalakṣaṇa*); excitation of cats, mongooses, snakes and other animals living in marshy places; rutting of young elephants; aquatic birds beginning to dry their wings; so on and so forth (*Kṛṣi-Parāśara*, verses 63-68). That these ideas were no innovations of astrologers and were actually shared by the people is evident from the fact that they are referred to in a large number of classics. Kalhaṇa, the poet-historian of Kashmir, for example, refers to the cows looking above, serpents ascending the trees, and ants moving with their eggs as foretelling an immediate rainfall:—*Uṭṭikite gavāṃ vṛkṣa-mūrdh-āroheṇa bhoginām, Pipilaka-kulays-āṇḍ-opasaṅkrānty-aiva-varṣaṇam* (*Rājatarāṅginī*, VIII. 722).

Classification of Clouds

Varāhamihira's *Bṛhat-saṃhitā*, which is the chief source of our information on the subject, does not give any classification. The *Kṛṣi-Parāśara*, however, divides the clouds into four classes:—*Āvarta*, (ii) *Saṃvarta*, (iii) *Puṣkara*, and (iv) *Droṇa*. One of these predominates over a particular year: while *āvarta* rains in particular localities only, *saṃvarta* rains everywhere; rainfall is scanty during the predominance of *puṣkara*, whereas there is plenty of rainfall when *droṇa* is dominant

(verses 24-26). As Kālidāsa refers to the *puṣkara* and *āvarta* types of clouds, this classification seems to have come into existence as early as, if not earlier than, the Gupta age (Cf. *Meghadūta*, *pūrvamegha*, verse 6: *Jātaṁ vaṁśe bhuvana—vidite puṣkar-āvartakānāṁ jānāmi tvāṁ prakṛtipuruṣaṁ kāmarūpaṁ maghonaḥ*). The popularity of this fourfold classification is apparent from references to *drona-megha* and *drona-vṛṣṭi* in Śūdraka's *Mṛochakaṭika*, X. 26, 39. The *Meghamālā* enumerates eighty types of clouds, ten each in the Mandara, Kailāśa, Koṭa, Jaṭhara, Śṛṅgavera, Paryanta, Himavat and Gandhamādana mountains; and next it gives their names, e.g. *Prabuddha* (or *Subuddha*), *Nandaśāla* or *Mandaśāla*, *Kanyada*, *Prthakśravas*, *Vāsuki*, etc. (Ms. No.844 of 1884-87. New No.24, folio-4a). These names are, however, not very clear and involve astrological details. A different type of classification appears to have been prevalent in earlier times. According to Kauṭilya (circa 4th-3rd century BC), there are three clouds that continuously rain for seven days; eighty are they that pour minute drops; and sixty are they that appear with sunshine:—*Trayas=sāptāhikā meghāḥ aśītiḥ kaṇa-śīkarāḥ*, *Saṣṭir-āyata meghānām=eṣā vṛṣṭis-samāhitā Vātam=atapa-yogaṁ ca vibhajan yatra varṣati*, *Trin karṣakām=śca janayaṁ=stastra sasy-āgamo dhruvaḥ* (Kauṭilya's *Arthaśāstra* 11. 24. 9-10).

Measurement of Rains

Rain-gauging appears to have been prevalent in India from very early times and the earliest reference to it is to be found in Pāṇini's *Aṣṭādhyāyī* (*varṣapramāṇa—III.4.32*; *goṣpada* is referred to as the smallest measure of rainfall, VI. 1.145; failure of rain or drought (*varṣa-pratibandha*) is referred to as *avagraha*, III.3.51).¹⁹ There were widely divergent views as to the time when one should start measuring rains and such other kindred matters. According to Varāhamihira, rain should be measured after the full-moon day of the month of Jyēṣṭhā (May-June) when it has rained in the asterisms commencing with Pūrvāṣāḍha:—*Jyāiṣṭhyāṁ samatītāyāṁ pūrvāṣāḍh-ādi-sampra-vṛttena*, *Śubham=aśubham vā vācyam parimāṇam c-āmbhasas=tajjñaiḥ* (BS, XXIII.1). According to still another view, the quantity of rainfall should be gauged when for the first time in the season it rains sufficiently enough to make the earth free from dust or when drops of water are visible on the tips of the blades of grass.²⁰ The quantity of future rainfall was also to be predicted accordingly as it rained in particular asterisms in the beginning of the season.²¹ It was believed that in whichever of the asterisms there was rain in the beginning, there will be repeated rains in the same asterisms (*ibid.*, XXIII.5).

Cf. Utpala—*prasava-kāle Āpy-ādiṣu Pūrvāśādh-ādiṣu sapta-vimśeṣu-api nakṣatreṣu yadi na pravṛṣṭam tadā tv=anāvṛṣṭiḥ prasava—kāle bhuvatīti*). Kaśyapa and others held that if there be rain in any area whatsoever in the beginning, one may expect good rain throughout the season.²² Devala, on the other hand, maintained that if it rains over ten *yojanas*, there is bound to be plenty of rain during the whole season.²³ According to Garga, Vasiṣṭha and Parāśara profuse rainfall must be expected if there be rain over an area of not less than twelve *yojanas* at the commencement of the rainy season.²⁴ The lowest measure of rainfall, *goṣpada*, which, as we have seen, was prevalent in the time of Pāṇini (cir. BC 500), is conspicuous by its absence in later works. In Varāhamihira's time (6th century AD) the commonest measures of rainfall were *pala*, *ādhaka* and *droṇa*: fifty *palas* made one *ādhaka* and four *ādhakas* constituted one *droṇa*. The rainfall was measured by means of a specially prepared (cf. BS, LII.91—पलान्यपामादकं चतुःषष्टिः Utpala—यत्र मृत्तिकानामादकमपामम्बूनां चतुःषष्टिः पलानि भवन्ति) round gauge with a diameter of one *hasta* or cubit (18 inches) and containing marks indicative of *palas*: when filled to capacity it indicated one *ādhaka* rainfall; *Hasta-viśālam kuṇḍakam=adhikṛty-āmbu-pramāṇa-nirdeśaḥ, pañcāśat palam=ādhakam=anena minuyāj-jalam patitām* (BS, XXII.2)²⁵ These measures appear to have been in use from very ancient times. According to Kauṭilya (4th century BC), *sannidhātṛ* or the superintendent of treasure-house was entrusted with the duty of measuring annual rainfall and the gauge used for this purpose was also one *aratni* or cubit in diameter: *Koṣṭhāgare varṣa-mānam=aratnimukham kuṇḍam sthāpayet* (*Arthaśāstra*, II.V.7) The *Samāsasaṃhitā* (as quoted by Utpala on BS, XXIII.2) describes this one cubit or *ādhaka* measurement as *Māgadha-māna (...jala-mānam Māgadha-mānena hasta-mite)*. It may thus be suggested that this system of measuring rainfall as mentioned by both Kauṭilya and Varāhamihira was prevalent in India, particularly in Magadha (South Bihar) from the fourth or third century BC to about the sixth century AD—for a period of about one thousand years. It is likely, therefore, that the Maurya and Gupta emperors introduced and popularised this system throughout the length and width of their extensive empire and consequently it became an all-India measurement.

According to Parāśara, however, the diameter and height of the rain-gauge should be 20 *aṅgulas* (15 in.) and 8 *aṅgulas* (6 in.) respectively and when it is filled to the brim it measures one *ādhaka*:—*Same vimś-aṅgul-ānāhe dvi-catuṣk-āṅgul-occhrite, Bhāṇḍe varṣati sampūrṇam jñeyam=ādhaka-varṣaṇam* (vide Parāśara as quoted by Utpala on BS, XXI.32).

Another similar method was of measuring the rainfall on the ground itself. Parāśara informs us that if the rain-water measures one *dhanuṣ* or four cubits it equals one *droṇa*: *Dhanuḥ pramāṇam medinyā vindyād=droṇ-ātivarṣaṇam* (vide Parāśara quoted by Utpala on BS, XXI.32).

A different interpretation of the measurement *ādḥaka* is to be met with in the *Kṛṣi-Parāśara*: a quantity of water spreading over an expanse of one hundred *yojanas* square and thirty *yojanas* in height equals one *ādḥaka* (*Agricultural Practices in Ancient India*, p. 30, fn. 2). This description is not quite clear.

The *Kṛṣi-Parāśara* prescribes the use of a vessel with 12 *aṅgulas* (9 in.) for its length, breadth and height for measuring rains. The vessel could be made of the wood of *calita* (*Dillenia Indica*), mango (*Mangifera Indica*) or *punnāga* (*Calophyllum inophyllum*) trees. The use of the wood of wood-apple (*Feronia elephantinum*), *pakur* (*Ficus infectoria*) or *nimba* (*Melia Indica*) trees was forbidden for the measuring vessel (*Kṛṣi-Parāśara*, verse 220).

According to a definition found in the *Meghamālā*, however, a continuous rain for seven nights together was called *droṇa*:—*Droṇa-saṅkhyā ca vijñeyā sapta-rātram pravaraṣati* (Ms. No.844 of 1884-87, New No.24, fol. 1b, verse 30).

Kauṭilya informs us that if one-third of the total annual rain came both during the commencement and closing months of the rainy season (*Śrāvaṇa* and *Kārttika*) and two-thirds in the middle (*Bhādrapada* and *Āśvayuja*) it augured good and prosperous crops:—*Varṣā-tribhāgaḥ pūrva-paścima-māsayoḥ dvau tri-bhāgau madhyamayoh suṣamā-rūpam* (*Arthaśāstra*, II.24-6). This coupled with the evidence of the *Bṛhat-saṃhitā* discussed above shows that the rainy season in those days commenced in the month of *Śrāvaṇa* and came to an end in *Kārttika* and not in *Āṣāḍha* and *Āśvayuja* respectively as in our times.

As regards average rainfall in different parts of the country in his time, Kauṭilya makes the following statement: "In the country of *Jāṅgala* 16 *droṇas*; half as much more in the moist countries; as to the countries fit for agriculture, 13½ *droṇas* in the *Aśmaka* country; 23 *droṇas* in *Avanti*; an immense quantity in *Aparānta*, the Himalayan region, and in the regions where water-channels are made use of in agriculture: *Ṣoḍaśa-droṇam Jāṅgalānām varṣa-pramāṇam=adhyardham=Ānūpānām; deśa-vāpānām=ardhatrayodaś-Āśmakānām; trayaviṃśatir=Avantīnām; amitam=Aparāntānām, Haimanyānām kulyā-vāpānām ca kālataḥ* (*Ibid.*, II.24.5)

The *Kṛṣi-Parāśara* (verse 30) would have us believe that if the total rainfall of the world be divided into twenty parts, ten parts fall on oceans, six on mountains and four on land.

To sum up, although a large number of texts dealing with ancient Indian meteorology have perished, what remains bears eloquent testimony to the great success achieved by our ancestors in this field of study. It is indeed curious to note that many maxims and proverbs current amongst the agriculturists at present have their roots in the observations made by Indians millennia ago. It is left to those well-versed in modern meteorological techniques to tell us how far the above-mentioned observations are correct.

Notes and References

1. *Annam jagataḥ prāṇāḥ prāvṛt-kālasya c-ānnam=āyattam*
Yasmād=ataḥ parīkṣyaḥ prāvṛt-kālaḥ prayatnena (BS., XXI.1) Cf. also XXI.2-4 where Varāhamihira extols persons skilled in predicting rains. For a similar idea, cf. *Kṛṣi-Parāśara* (KP), verse 10.
2. Utpala informs us that Ch.XXVII on 'Circle of Winds' (Vātacakra) is spurious—
'ataḥ param kecid=vātacakraṁ paṭhanti tac=ca Varāhamihira-kṛtaṁ nā bhavati yato
Niṣpattir=agni-kopo vṛṣṭir=mand-ātha madhyamā śreṣṭhā Bahu-jala-pavanā puṣṭā śubha
ca pūrv-ādibhiḥ pavanaiḥ, (BS, XXVII 13) *iti anena paunaruktyaṁ bhavati.*
Bahuṣv=ādarsēṣṭ na dṛśyate.
3. Having critically analysed available data Mr S.C. Banerji concludes that the work cannot be later than the eleventh century AD (*ABORI*, XXXVI (1955), pp.2-6). J. Bentley considers it to be an 'insignificant little work' and 'a most palpable forgery' (*Asiatic Researches*, VI, p. 576), but there is hardly anything to substantiate this view. As the original Sanskrit text is not available to me, I have used its Engl. Transl. by S.P. Raychaudhuri (*Agricultural Practices in Ancient India* [Indian Council of Agricultural Research, New Delhi, 1953], pp.26-48).
4. These are—1. No. 844 of 1884-87, New No. 24, fol.12; 2.407 of 1884-86, New No. 26, fol.45. Both these works are called *Raudrī Meghamālā* and the colophon of the former represents it as a section of the *Gārgīsam—hitā—iti—Śrī—Gārgīsamhitāyām Raudrī Meghamālāyām garbha-saṁyogam śamāptam iti*; 3.971 of 1886-92, fol.30. It was copied in V.S. 1759 and is called *Māheśvarī Meghamālā* in the colophon; 4.973 of 1886-92, fol. 20, is called *Bhairavokta-Meghamālā*; and was copied in Śaka 1760. These Mss. differ very little from each other and are in the form of a dialogue between Śiva and Pārvatī. Apart from a number of orthographic mistakes, there is more of astrology than meteorology proper.

5. *Śukla-pakṣam*=*atikramya Kārttikasya vicārayet*,
Garbhāṇām sambhavam samyak—sasya sampatti-kāraṇam.
6. *Yan*=*nakṣatram*=*upagate garbhaś=candre bhavet sa candra-vaśāt*, *Pañcanavate dina-śate tatr—aiva prasavam=ayāti.* BS, XXI. 7. cf. *Samāsa-saṁhitā* quoted by Utpala:—*Śārdhaiḥ sadbhīr=māsaiḥ garbha vi—ākah sa nakṣatre.*
7. *Sita-pakṣa-bhavāḥ kṛṣṇe śukle kṛṣṇā dyu-sambhavā rātrau*,
Nakṣam prabhavās=c—āhani sandhyā-jātās-ca-sandhyāyām
Pūrv-odbhūtāḥ paścād=apar-otthāḥ prāg=bhavanti jīmūtāḥ
Śeṣāsu=api dikṣu=evam viparyayo bhavati vāyoś=ca. BS XXI.8, 13.
Cf. Garga's verses (On BS, XXI.8) where more details are given.
8. Utpala (on BS, XXI.9) tells us that in regard to the conception of clouds and their delivery we should follow the *Amānta* reckoning—*Asmīn garbha—lakṣaṇe Caitra—sit-ādayo māsā vijñātavyāḥ.*
9. Cf. *Samāsa-saṁhitā* (Utpala on BS, XXI.7)—*Pauṣ—āsitapakṣ-āyaiḥ Śrāvaṇa-śukl-ādayo vinirdeśyāḥ.* Cf also *Parāśara* quoted on BS, XXI.13.
10. BS, XXI.22-24. See also 3 verses from *Samāsa-saṁhitā* quoted by Utpala.
11. BS, XXI, 19-22. Cf. *Samāsa-saṁhitā*:—
Śastāni Mṛgānmāsāc=chita-hima-vāyu-megha-kṛtāni,
Stanita-tadīj=jala-māruta-ghana-tāpāny=atiśoyam tu Vaiśākhe.

According to Kaśyapa quoted by Utpala, one should examine cold, clouds, wind, solar and lunar haloes and should accordingly predict rain in the month of Śrāvaṇa; lightning, rain, thunder and easterly wind in Phālguna augur good rain in Bhādrapada; trees teeming with plenty of flowers and fruits, winds scattering sand, cold, rain and clouds in Caitra indicate profuse rains in Āśvayuja; soft easterly winds and fast southerly winds in Vaiśākha are indicative of rain in Kārttika.

12. BS, XXI.27:—*Svartu-svabhāva-janitaiḥ sāmānyair=yaiś=ca lakṣaṇair=vṛddhiḥ*,
Garbhāṇām viparītais=tair=eva viparyayo bhavati.
13. Utpala on BS, XXI, 29:—*eteṣāṁ madhyād=ekatamena nakṣatreṇa sambhūtāḥ śubhaḥ*
śubha=phalo bhavati sa ca bahūn divasān puṣṇāti prabhūtāni ahāni puṣṭim
nayati...etad=uktaṁ bhavati, hatas=tāvanti, eva dināni na varṣati.
14. *Mṛga-mās-ādiṣu=aṣṭau ṣaṭ ṣoḍaśa viṁśatiś=catur-yuktā*,
Viṁśatir—atha divasa-trayam=ekatama=rkṣeṇa pañcabhyah.

BS, XXI.30.

Utpala tells us that this rule is an exception to BS, XXI.9, viz., foetuses formed in Mārgaśīrṣa and Pauṣa śukla bear but little fruit;—*tathā Mṛgaśīrṣ-ādyā garbhā manda-phalā ity=anena granthena Mārgaśīrṣa-jātānām garbhāṇām Pauṣa-śukla-jātānām manda-phalatā uktā tad=apavādam=āha.*

15. *Pañca-nimittaiḥ śata-yojanam tad=arddh-ārdham=eka-hānyātah*,
Varṣati pañca-nimittād=rūpeṇ-aikena yo garbhaḥ. BS, XXI.31.
 Utpala informs us that this verse also appeared in the *Samāsa-saṁhitā*.
16. *Garbhaḥ puṣṭaḥ samaye grah-opaghat-adibhir=yadi na vṛṣṭaḥ*,
Ātmīya-garbha-samaye karakā-miśram dadāty=ambhaḥ,
Kāṭhinyam yāti yathā cira-kāla-dhṛtaṁ payaḥ payasvinyāḥ.
 BS, XXI.35-36.
17. *Nām-āṅkitais=tair=udak-ādi-kumbhaiḥ pradakṣiṇam Śrāvāṇa-māsa-pūrvaiḥ, Pūrṇaiḥ*
sa māsaḥ salilasya dātā srutair=avṛṣṭiḥ parikalpyam=ūnaiḥ (BS, XXIV.26).
 Cf. Utpala: *etad=uktaṁ bhavati, udak kumbhaḥ Śrāvāṇamāsaḥ parikalpyaḥ; prāg*
Bhādrapadaḥ; dakṣiṇa Āśvayujḥ; paścimasthaḥ Kārttikah parikalpyaḥ iti.
18. *Ślakṣṇām patākām=asitām vidadhyād daṇḍa-pramāṇām triguṇ-occhritām ca, Ādau kṛte*
dig=grahaṇe nabhasvān grāhyas=tayā yoga-gate śāsāṅke, Ten-ātra māsāḥ praharair=
vikalpyāḥ varṣā-nimittam divasās=tad=aṁśaiḥ (BS, XXIV. 9-10).
 We have preferred Utpala's reading "ten-ātra māsāḥ" in place of "tatr-ārdha-
 māsāḥ" as given in the printed edition of the text.
19. V.S. Agrawala, *India as known to Pāṇini*, p. 203.
20. *Yena dharitṛi mudrā janitā vā bindavas=trṇ-āgreṣu I*
Vṛṣṭena tena vācyam parimāṇam c-āmbhasaḥ prathamam II
 BS, XXIII.3
 Cf. Utpala *varṣe=pi sati bhavatsv=api garbheṣu dhāraṇāsv=api satsu yadi pravaraṇa-*
kāle na varṣati tadā prasava-kāle vṛṣṭir=na-syād=ity=ataḥ garbhaṣu idam=ucyate
parimāṇam c-āmbhasaḥ prasava-kāle vācyam=iti 1.
21. Vide BS, XXIII.6-10. Cf. Utpala on BS, XXIII.3:—*Etad=uktaṁ bhavati, Pūrvāśādh-*
ādau prathamam yena nakṣatreṇa varṣaṇam bhavati ten-aiva jala-pramāṇam loke
vaktavyam, n-āpareṇa nakṣatreṇa.
22. *Pravarṣaṇe yath-ādeśam varṣaṇam yadi dṛśyate I*
Varṣā-kālam samāsādya Vāsavo bahu varṣati II
 Kaśyapa quoted by Utpala on BS, XXIII.4.
23. Devala quoted by Utpala:—
Pravarṣaṇe yadā vṛṣṭam daśa-yojana-maṇḍalam I
Varṣā-kālam samāsādya Vāsavo bahu varṣati II
24. Garga quoted by Utpala:—
Āśādh-ādiṣu vṛṣṭeṣu yojana-dvādaś-ātmake I
Pravṛṣṭe śobhanam varṣam varṣā-kāle vinirdiśet II
25. The measure *droṇa* is referred to in BS, XXI. 32, 34; XXIII.6-9.

Appendix 5

Dakārgala or the Art of Exploring Underground Water-Veins

Antiquity	509
Varāhamihira's Treatment	509-510
Means of Ascertaining Water-Veins (<i>Śirā-nimittāni</i>)	510-511
Situation of Wells	511
Embankment of a Pond	511-512
Recipe for Clearing Water	512
Notes and References	513-514



ANTIQUITY

The history of the art of exploring underground currents of water in India goes back to a hoary antiquity. It appears to have reached a fairly developed stage as early as the sixth century BC. For in the *Varaṇṇupatha Jātaka*¹ we find the following story:— Once the Bodhisattva, born as a merchant, set out on a mercantile adventure. While passing through a wilderness, he lost his wood and water. In search of water he ranged to and fro, while it was still early and cool until he came across a clump of *kuśa* grass. 'This grass', thought he, 'can only have grown up here, thanks to the presence of water underneath'. He dug out a hole and up rose the water in the hole till it was as high as a palm tree. With due allowance for the obvious exaggeration, it indicates that one of the modes of ascertaining the presence of water-springs underneath was to make a minute observation of the growth of vegetation. Unfortunately no treatise of such an early date affording a detailed discussion of this subject has come down to us.

VARĀHAMIHIRA'S TREATMENT

Varāhamihira dilates on this subject in some detail in Ch. 53 of the

Brhat-saṃhitā. He call this art *dakārgala*² or *udakārgala*³ which term evidently refers to the determination of the subsoil water (*udaka*, *daka*) with the help of a wooden stick (*argala*), an art still practised in some parts of the country. He was, however, not the first to dwell on this topic. As we have seen above,⁴ he had access to the writings of Sārasvata and Manu dealing with this subject. These works were also available to Bhaṭṭotpala. However, as these treatises are no more extant and as this topic is not known to have been dealt with in any other ancient work also, the *Brhat-saṃhitā* chapter under review forms the only source of our information about the state of hydrological knowledge in ancient India. This chapter appears to have been considered unique in the whole range of Sanskrit literature, and as such it was studied as an independent text as is clear from the fact that independent manuscripts containing only this chapter (called *Jalārgala-śāstra* and *Dṛgargala*, an error for *Dakārgala* or *Dagārgala*) are reported to have been discovered.⁵ Even in our own times this chapter has been independently published and has been widely popular with architects having some attachment with things ancient. Some architects, who happen to be my personal friends, tell me that their experience has demonstrated the correctness of many of the details and general principles laid down by Varāhamihira. A brief analysis of its contents is given in the lines that follow.

Means of Ascertaining Water-Veins (śirā-nimittāni)

It was recognised that though all the water falling from heaven is originally of the same colour and taste, it becomes different in these respects on account of the difference of the soil (2).⁶ Sub-soil water-veins, some running higher and other deeper, are compared to the veins in the human body (1) These veins were variously named; eight veins in the different directions were known after the regents of the regions, the ninth in the centre being called Mahāśirā (great vein). Other veins issuing from the above⁷ bore different designations (3-4), the one called Kumuda (a vein 2 cubits to the north-west of a Bignonia in a dreary region) being mentioned by name (23). The veins running from the infernal regions and in the four quarters were regarded as auspicious and those issuing from intermediate points evil (5). The presence of water was ascertained mainly through its vegetable accessories, e.g., presence of a certain tree in a waterless tract, sometimes accompanied by an ant-hill⁸ or a snake's abode⁹; characteristics of an aquatic vegetation in a waterless region (47), a plot overgrown with grass in a grassless plain or a grassless plot in the midst of a soil abounding with grass (52), a thorny tree in the midst of thornless ones or a thornless tree in

the midst of thorny ones (53), one of the branches of a tree being bent or faded (55), a tree showing unnatural symptoms in its fruits and blossoms¹⁰ (56), two or more trees growing conjointly (72, 74, 75, 76, 78, 83, 96), so on and so forth. It is further stated that the sprouting corn perishing, growing abundantly¹¹ or looking pale in a single spot of a field (61), the soil sounding deep when struck by the feet (54), the ground steaming or smoking (60) or sloping downwards (93), the occurrence of a piece of unusual appearance (grass) in a ground otherwise uniform and devoid of grass, trees or shrubs (90), insects frequenting a spot without having their abode there (93), a row of ant-hills with one prominent above the rest and the corn in a field withering away or not growing at all (95) indicate water underneath. Bushes and trees growing low, looking smooth and having their long boughs hanging down (49,100) were also taken to indicate the presence of water underneath. We are also told that an isolated cold spot in a warm ground denotes cold water, while a solitary warm spot in a cold ground indicates warm water (94) and that a copper-coloured soil mixed with gravel yields astringent water; red-brown brackish water; pale yellow earth is indicative of salt, and a blue soil of sweet water (104).¹² The fact that water-springs in a woody tract (*jāṅgala*) are situated at a lower level than in a watery country (*anūpa*) and in a desert even lower than in woody region is also recorded (62, 86, 89, 93). Varāhamihira describes in detail the various signs that one will come across in the course of digging a well, the quantity and the taste of water, etc., which need not detain us here.

Situation of Wells

The presence of a well in the south-east, south-west or north-west of a town or village was supposed to bring about various distresses, wells in other directions being approved (97-8).

Embankment of a Pond

The embankment (*pālī*, of a pond) extending from east to west, it is said, retains water for a long time while that from north to south does not, for the latter is often broken by billows roused by the wind. Varāhamihira advises one wishing to make such a pond to check the flow of water with strong timber or stones and the like (Utpala adds burnt bricks and large pebbles), the soil being hardened by the trampling of elephants, horses, etc. On one side, it is stated,

an outlet should be made, the passage being built with stones, and a panel without aperture fixed in a frame, and covered by grit heaped against it.¹³ The banks of ponds were to be shaded by trees (118-207).

Recipe for Clearing Water

(121-2). A mixture of *añjana*, *mustā*, *uśīra*, *rājakośātaka*, *emblic myrobalan* and *kataka* nuts was used in order to impart clarity, good taste and other qualities to water.¹⁴

In an agricultural country like India the importance of the art of divining subsoil water can hardly be overestimated. Notwithstanding the great industrial development which our country has gone through, Indian economy is still mainly agricultural. The question of providing suitable means of irrigation and drinking water in different parts of the country continues to pose a serious problem, and the problem is especially acute during summer months. While we must of necessity adopt modern scientific methods and techniques to tide over this formidable problem, it is equally desirable to conduct researches and know more and more about the hydrological practices prevailing in ancient India. These practices certainly had a scientific basis, the theoretical and applied study whereof is bound to go a long way in satisfying the need for water for the purposes of irrigating dry land and drinking.

Even modern principles of hydrological research take into consideration the floral and faunal evidences, and several modern hydrogeologists are of the opinion that Varāhamihira's description is highly scientific, and allowance should be made for much greater vegetation fostering tremendous animal wealth in the past.

Among certain tribes the practice of locating subsoil water with the help of a Y-shaped twig is still in vogue and is faintly reminiscent of the practices obtaining in the past, especially as regards the stick which is implied by the word *argala*. It is used in the same manner in the Western countries. For an account of this and some other curious practices prevalent among the Bhils of Central India, see Fr. M. Hermanns, S.V.D., "The Indian Water-Diviners", *Indica*, Silver Jubilee Commemoration Volume, Bombay, 1953, pp.170-73. The success of the modern followers of ancient practices is commensurate with their scientific and technical equipment.

Notes and References

1. *Jātaka* (Fausboll's ed.), Vol. I, No.2.
2. LIII.1, 99. *Dagārgala* in a variant, Halāyudha gives *daka* as one of the words denoting water:—*proktaṁ prājñair=bhuvanam=amṛtoṁ jīvanīyaṁ dakaṁ ca*. For the use of *daka* in the sense of water, cf. *Divyāvadāna*, VIII. 262 f. (*daka-rākṣasa*): *Suśruta*, I. 26.8; II. 7; III.8; V. 236. Grammarians derive this form from *udaka* according to *Pr̥ṣodarādi*.
The word *argala* means a wooden belt, pin, bar, bolt, latch, etc. Vide V.S. Apte's *Students' Sanskrit-English Dictionary*, s.v. *argala*. Monnier-Williams takes *dagārgala* to mean 'water-key', 'examining the soil in searching for wells or rules for doing so'. Vide his *Sanskrit-English Dictionary*, s.v. *dagārgala*. But it is more appropriate to take it in the sense of searching water (*daka*) by means of a wooden stick (*argala*).
3. CVI.7.
4. *Supra*, pp.443-44, 450.
5. See *supra*, Chapter 1.
6. Figures in brackets refer to the serial number of verses of Ch.53.
7. Cf. *Suśruta*, I. 45. 3-4; *Kaśyapa-saṁhitā*, Khilasthāna, p.329, I.15:— *Nānā rasatvaṁ bhajate toyam samprāpya bhūtalem*.
Kern's translation (*JRAS*, 1873, p. 300), viz. 'There are hundreds of others, that issue from different quarters', does not appear to be quite correct. *Etābhyah* should be taken to refer to the nine veins mentioned above.
8. LIII.9, 12, 14, 16, 19, 24, 25, etc.
9. 33, 35, 38, 41, 67, 68, 70.
10. E.g., *kaṇṭakārikā* without thorns and with white blossoms (57), a betelnut tree with two tops in a waterless region (58), a white blossoming *pterospermum* or *Butea* (59).
11. Kern's rendering, 'Where, on a single spot of a field, the sprouting corn perishes, or looks thin and exceedingly pale...' is not correct. '*Snigdha*' is rightly taken by Utpala to refer to exceedingly good crop:— *Athavā tatr-aiva kṣetr-oddeśe snigdham sasyam=atīva bhavati*
12. Cf. *Śūśruta*, Sūtrasthāna, XLV.5-6.
13. पाली प्रागपरायताम्बु सुचिरं घटे न याम्योत्तरा
कल्लोलैरवदारमेति मरुता सा प्रायशः प्रेरितैः।
तां चेदिच्छति सारदारुभिरपां सम्पातमावारयेत्
पाषाणादिभिरेव वा प्रतिचयं क्षुण्णं द्विपाशवादिभिः॥
द्वारं च नैर्वाहिकमेकदेशे कार्यं शिलासञ्चितवारिमार्गम्।
कोशस्थितं निर्विवरं कपाटं कृत्वा ततः पांशुभिरावपेत् तम्॥

LIII. 118, 120.

14. Cf. *Sūśruta*, I. 45. 17. The constellations of Hasta, Maghā, Anurādhā, Puṣya, Dhaniṣṭhā, the three Uttarās, Rohiṇī and Śatabhiṣaj are recommended for the commencement of digging a well, cf LIII. 123. At the beginning of digging, oblation was made to Varuṇa, and a plug of banyan or rotang was put into the soil at the place of the vein and honoured with flowers, perfumes and incenses, cf. LIII.124.

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Index

- ābharāṇa*, ornaments, 225
abhicāra, black magic, 176-77, 200
Abhidhāna-cintāmaṇi, t., 96, 119
Abhijñāna-Śākuntala, t., 248, 288. 290
 Abhinavagupta, a., 137
Ābhīra, p., 64
Abhisāra, c., 65, 72
abhiyojya, 479
 Abhona plates, 187
Abhyañjana, 239
 Abjanābha, god, 134
 Ācārya Brāhmaṇa, 473
 Acharya, P. K., a, 264, 385, 412, 415, 417, 422, 463, 466
 Achaemenian empire, 470, 471
 Adarśa, 48, 65
 Aḍhabhāra copper-plates of Nanna II, 97
Adbhuta-sāgara, t., 22
āḍhaka, measure of capacity, 326, 354, 388, 504, 505
ādhāra, 241
ādhikaraṇika, office, 481
adhikṛta, do., 381, 481
adhimāsa, 6
adhirājyārthin, 484
adhivāsana, 168
adhivāsana-maṇḍapa, 167
adhvaryu, priest, 166,
adhyakṣa, office, 381, 480
adhyakṣara, metaphysics, 243
 Aditi, goddess, 157
 Āditya, god, 143, 474
 Ādityadāsa, Varāhamihira's father, 12, 14, 17, 18, 19, 38, 469
 Ādityadeva, real name Śabarāsvāmin, 17-18
 Ādityas, *gaṇa-devatās*, 157
 Adrisutā, goddess, 156
 Agastya, sage identified with Canopus, 57, 131, 163, 205, 362, 437, 478, 484
 Āgneyi south-east, 144
 Agni, god, 144, 146, 157, 158, 163, 168, 189, 248, 315, 319, 336, 360, 363, 491
 Agnidhra (v. l. Agnitya, Agrivya), p., 65
 Agnihotra, sacrifice, 164, 367
agni-lakṣaṇa, 374, 433, 440
Agni-purāṇa, t., 81, 85, 91, 93, 98, 101, 114, 174, 233, 234, 238, 258, 259, 335, 412, 486
agrajanman, 246
 Agrawal, J. N., a., 89, 262
 Agrawala, V. S. a., 37, 52, 60, 100, 102, 107, 109, 112, 120, 121, 122, 137, 139, 186, 188, 190, 191, 192, 195, 248, 251, 252, 253, 254, 255, 265, 345, 374, 412, 413, 508,
 agriculture, 268; produce, 269; superstitions, 272
ahargaṇa, 4, 5, 36, 449, 464

Note: Additionally to the abbreviations listed at the beginning of the book the following have been employed specifically in the index: - a = author, c = country, l = locality, m = mountain, p = people, r = river, t = text, VM = Varāhamihira.

- Ahi, deity, 391
 Ahirbudhnya, *do.*, 157, 491
 Aihole inscription of Pulakeśin II, 5, 35, 71, 83
 Airāvata, elephant, 321
 Aitareya Brāhmaṇa, *t.*, 47, 66, 81, 89, 118
 Aiyangar, A. N. S., *a.*, 14
 Aiyangar, K. V. R., *a.*, 14, 246
 Aiyangar, S. Krishnaswamy, *a.*, 55, 111
 Aiyer, V. G., *a.*, 6, 34
 ajagandhaka, fish, 299
 Ajapāda, deity, 157
 Ājīvika, sect, 179
 Akaltara inscription of Kalacuri Ratnadeva II, 152
 Ākara, *c.*, 65
 ākranda, 479, 485
 ākrandasāra, 476, 485
 akṣa, axle, 316
 Alaka (kā), *l.*, 100
 alaṅkāra, ornaments, 225
 Alberuni, Arabic writer, 2, 8, 20, 21, 22, 28, 32, 36, 45, 50, 52, 54, 62, 63, 65, 72, 73, 74, 76, 79, 81, 82, 86, 87, 92, 93, 96, 103, 107, 108, 118, 122, 142, 188, 353, 430, 431, 445, 447, 448, 449, 450, 451, 453, 463
 Ali, S. M., *a.*, 95
 Alina copper-plate inscription of Śilāditya VII, 55, 56, 57, 136, 152
 alinda, balcony, 382, 383, 387, 413
 Allahabad pillar inscription of Samudra Gupta, 11, 48, 49, 78, 79, 91, 119, 485
 Allan, J., *a.*, 120, 121, 191, 196,
 Almagest, *t.*, 438, 445
 Altekar, A.S., *a.*, 184, 191, 248, 377, 483
 āmalaka, 401
 amānta system, 7
 Amara, *a.*, 17, 39
 Āmarāja, commentator of Brahmagupta's Khaṇḍakhādya, 8, 9, 15, 34
 Amarakoṣa, lexicon, 101, 116, 135, 150, 151, 159, 191, 194, 206, 223, 224, 228, 229, 246, 247, 251, 255, 256, 257, 262, 278, 280, 281, 282, 283, 284, 285, 286, 287, 288, 290, 291, 292, 293, 294, 310, 325, 332, 336, 348, 354, 394, 412, 415, 486
 Amaru-śataka, *t.*, 22
 amātya, office, 412, 480, 485
 Ambara, *p.*, 65
 Ambarāvata, *p.*, 65
 Ambaravati, *l.*, 65
 Ambaṣṭha, *p.*, 65
 ambucārin, animals, 294, 295
 ambupati, epithet of Varuṇa, 131
 ambu-yantra, 243
 amśuka, 223
 Anala, god, 144
 Anala, year, 490
 Ānanda, *do.*, 494
 anantarajit, 242, 264, 479
 Ānarta, *c.*, 45, 65-66
 Anavasita, metre, 458
 aṇḍa, 401, 402
 Andhra, *c.*, 66
 Aṅga, *c.*, 48, 310
 Aṅga, a branch of Saṁhitā, 430, 434, 435, 461
 Aṅga-cūḍāmaṇi, *t.*, 23
 aṅgada, armlet, 230
 Aṅgāra, year, 490
 aṅgārīṇi, 372
 aṅgavidyā, 366, 376
 Aṅgaviṣṭāpāṇṇayam, *t.*, 366, 375, 376, 377
 Aṅgaviniścaya, branch of Jyotiṣa, 430, 459
 Aṅgiras, sage, 162
 Aṅgiras, year, 489
 aṅgula, measure, 263, 324, 327, 328, 354, 369, 370, 380, 405-06, 407-10, 423, 424, 425, 426, 427, 452
 aṇi, axle-pin, 307
 Anila, god, 146, 391

- Añjana, *m.*, 51
 anna, 212
 Antaḥśaila, *m.*, 52
 antaḥpuracintā, 435, 477, 484
 Antardvīpin, *c.*, 66
 Antargiri, *m.*, 52
 Antarikṣa, god, 391
 Antarvedī, region, 49, 57, 370
 Antaḥśaila, *m.*, 52
 antyaja, 247
 antya-jātya, 206
 antya-śilpa, 306
 Antyavidaraṇa, eclipse, 437
 antya-vṛtti, 306
 Anurādhā, *nakṣatra*, 146, 162, 168, 249, 359, 489, 499, 514
 Anuṣṭubh, metre, 458
 Anuvatsara, year, 491
 Anuviddha, *p.* or *c.*, 66
 Anuviśva, *p.* or *c.*, 68
 Anuyogadvārasūtra, *t.*, 223, 255
 Ānvīkṣiki, 243, 456, 466
 Āpaḥ, deity, 391
 Aparānta, territory, 47, 50, 110
 Aparāntaka, inhabitant of Aparānta, 50
 Aparāntya, 50
 Aparārka, commentator of *Yajñavalkyasmṛti*, 181, 190, 250
 aparasasya, Rabi Crop, 268, 331
 Aparavatra, 458
 apasavyāgra, 241
 apasmāra, epilepsy, 220
 Āpastamba-dharmasūtra, *t.*, 211, 250
 Āpastamba-gr̥hyasūtra, *t.*, 209, 418
 Āpavatsa, god, 391
 Aphsad inscription of Ādityasena, 75, 152, 185
 Apoteleasmatla, *t.*, 438
 Apsarases, 159, 172
 Apte, V. S., a., 513
 apūpa, 212
 aquatic animals, 299
 ara, spoke, 307
 ārakṣaka, office, 481
 āraṇya, wild animals, 294
 aratni, measure, 231, 327, 328, 504
 Arava, *p.* or *c.*, 66
 arbori-horticulture, 272-77
 Arbuda, *m.*, 51
 architecture, residential, 379-94, temple, 394-403
 Ardhā, pearls, 320
 Ardhāgaurīśvara (same as Ardhanārīśvara), 140
 ardhaḡuccha, necklace, 228
 ardhahāra, *do.*, 228, 256
 Ārdra, *nakṣatra*, 139, 162, 177, 487, 498
 Arghā, pearls, 320
 Arhat, 178, 200
 Arimeda, *p.*, 66
 Ārjunāyana, *p.*, 66-67, 114
 army, 481
 arṇavayāna, 311
 Ārohaṇa, Planetary Conflict, 447, 464
 Arrian, Classical writer, 54, 58
 Arthaśāstra, *t.*, 10, 68, 113, 199, 227, 228, 229, 247, 250, 252, 254, 255, 256, 257, 301, 312, 315, 316, 327, 328, 331, 334, 337, 344, 345, 346, 350, 351, 352, 353, 354, 375, 380, 455, 466, 478, 484, 485, 486, 496, 499, 503, 504, 505
 Arthaśāstras, 176, 455
 Aruṇa, comets, 146,
 Arundhatī, 162
 Āryā, 48
 Āryā, metre, 458, 459, 467
 Āryabhata, astronomer, 2, 9, 11, 14, 30, 35, 431, 446, 449, 460, 463, 464, 489
 Āryabhaṭīya, *t.*, 9, 460, 464, 493
 Āryāgīti, metre, 458
 Āryaka, *p.*, 71
 Aryaman, god, 146, 391

- Āryasiddhānta*, t., 492
Āryāvarta, territory, 48, 49, 59, 65
Āṣāḍha, year, 489
Asika, c., 67-68
Asita, astronomer, 439, 495
Asita-Devala, do., 495
Āśleṣā, *nakṣatra*, 162, 163, 177, 488, 498
Aśmaka, c., 69-70
Aśoka, Rock Edicts of, 50, 66, 76, 87, 89, 116, 120
āśphoṭita sound, 245, 266
Āśramas, 207
Āśramin, 207
Astadhrādhara, mythical mountain, 477
Aṣṭādhyāyī, t., 99, 412, 496, 503
Aṣṭagiri, m., 51
Aṣṭāṅga-hṛdaya, t., 12, 251, 254, 261
Aṣṭāstri, temple, 399, 402
Ashthiketu, comet, 361
 astrology in every-day life, 356-78
aśubha-dṛṣṭi, 177
Asuras, demons, 128, 129, 150, 161, 195, 391, 404
Aśva-cikitsa, t., 297, 340
Aśvaghoṣa, poet and play-wright, 48
Āśvalāyana-grhyasūtra, t., 131, 249, 412
Aśvamedha, sacrifice, 164
Aśvamukha, p., 50, 68, 96, 159
Aśvattha, p., 50, 68
Aśvatthāman, epic hero, 11
Aśvavadana, p., 51, 68
Aśva-vaidyaka, t., 297, 340
Āśvayuja, year, 489, 493
Asivin, gods, 491
Aśvinī, *nakṣatra*, 146, 161, 237, 489
Aśvins, gods, 146, 491
āṭavikas, fort, 481, 486
Ātharvaṇa Brāhmaṇa, t. 204
Atharva, t., 47
Atharvaśirasa Upaniṣad, 187
Atharvaveda, t., 47, 66, 82, 131, 145, 158, 164, 177, 204
atīsāra, dysentery, 220
Ativakrā, motion of Mercury, 440
Atkinson, a., 93
Atri, astronomer, 438, 441, 489
Atri, sage, 162
Aucityavicāracarcā, t., 28
Audumbara, p., 97
Aufrecht, 22
Aulikara dynasty, 16, 440-41
Aupacchandāsika, metre, 458
aurṇika, woollen cloth, 223
Avagāṇa, p., 68, 361
avamaśeṣa, 6
Āvanta, 12
Āvantaka, p., 69
Avanti, c. and l., 45, 50, 68, 124, 439, 440, 441, 462
Āvantika, 12, 13, 15, 38
Āvantikā cārya (-VM), 12, 13, 38
Āvantyaka (-VM), 12
Āvarjita, appearance of moon, 359
avarṇaja, mixed castes, 205
Āvarta, cloud, 502, 503
Āvarta, comet, 361
āvarta, hairy circle, 297, 366
āvika, 223
ayana, 376
ayanāmśa, 4
ayas, 302
Ayodhyā, l., 61, 100
āyudha, 482, 486
Badara, p., 69
Bādarāyaṇa, astronomer, 3, 434, 462, 495
Bāgapura, l., 45
Bagchi, P. C., a., 94, 121, 135
Baghaura inscription of Mahīpāladeva, 92
Bahihśaila, m., 52
Bahirgiri, m., 52
Bāhlika (v. l. Bāhlika, Vāhlika, Vāhlika), c., 69

- Bahrām V, Sassanian emperor, 471
 Bahudhānya, year, 490
Bahvṛc Brāhmaṇa, 204
 Baigram copper-plate inscription of Gupta year, 128, 330
Baijavāpa-gr̥hyasūtra, t., 190
 Bajpai, K. D., a., 39, 115, 186
 Bala, demon, 160, 313
 Baladbhadra, commentator of *Br̥hajjātaka*, 20
 Balabhadra, a., 448
 Balabhid, god, 127, 491
 Baladeva, do., 132, 134, 135, 147-48, 149, 155, 156
 Baladevaa, 439, 462
 Baladevapattana, l., 100-101
balamukhya, office, 480, 485
balanāyaka, do., 480, 485
balapati, do., 480, 485
 Balarāma, god, 137
Bāla-Rāmāyana, t., 48
 Bali, demon, 136, 160, 405, 424
 Ballālasena, a., 22
 Bāṇa, poet, 49, 174, 189, 206, 209, 211, 226, 227, 228, 229, 381
 Banerjea, J. N., a., 139, 149, 152, 156, 183, 184, 187, 198, 404, 425, 426, 427, 476
 Banerji, R. D. a., 67, 352, 419
 Banerji, S. C. a., 506
 Barbara, p., 69
 Bargaon grant of Ratnapāla, 89
 Barua, B. M., a., 114, 123
 Basak, R. G., a., 350
 Basantagarh inscription, 69
 bath-powders, 234
 Baudhāyana, a., 48
Baudhāyana-dharmasūtra, t., 48, 190, 248, 377
Baudhāyana-gr̥hyasūtra, t., 249
 Beal, S. a., 187
 Bedsa inscriptions, 104
 Belva grant of Bhojavarmadeva, 105
 Bentley, J. a., 31, 40, 451, 452, 506
 Bevan, E. R. a., 158
 Bhadra, p., 50, 69-70
 Bhadra, elephant, 295, 337
 Bhadra, wagtail, 298, 321
 Bhadra, great man, 368, 369, 370, 371, 377
 Bhadrabāhu, Jain patriarch and author, 18-19, 469
Bhādrabāhvī Samhitā, t., 18-19
 Bhādrapada, year, 489, 493
bhadrapiṭha, 240, 242, 264
bhadrāsana, 167, 173, 174, 198, 240, 241-42, 264
 Bhadrāśva, p., 69, 70
 Bhaga, god, 146, 491
 Bhagadatta, k., 7
 Bhagandara, sage, 162
Bhagavat (—Visnu), 134
Bhāgavata, sectarian title, 134, 135, 168, 199
Bhāgavata-purāṇa, t., 108
 Bhāguri, a., 15, 172, 439, 442, 450, 462, 465
 Bhairava, god, 23
 Bhalla, p., 70
 Bharaya, 212, 215
 Bhallāta, god, 391
 Bhandarkar, D. R., a., 14, 87, 119, 188, 191, 192
 Bhandarkar, R. G., a., 83, 110, 136, 150, 184
bhaṅgāñjana, 239, 303
 Bhānuji Dikṣita, commentator of *Amarakoṣa*, 101, 157, 194, 256, 257, 291, 332, 486
bhāra, weight, 325, 369
 Bhāradvāja, astrologer, 439, 440, 462
 Bharani, *nakṣatra*, 144, 162, 489
 Bharata, a., 2, 130
 Bharata, p., 46, 70
Bhārata, great epic, 10, 11, 176
Bharata, k., 46
 Bharatamuni, a., 137, 390, 411
 Bhāratavarṣa, 45-46, 47
bhāratulā, cross-beam, 385, 414

- Bharhut inscriptions, 101
 Bharukaccha, *l.*, 101, 369
 Bhāskara, *a.*, 424
 Bhāskara, commentator, 22, 460
 Bhāskarācārya (also Bhāskara), astronomer,
 2, 8, 9, 36, 451
 Bhāskaravarman *k.*, 7
Bhāsvatī-karaṇa, *t.*, 2, 31-32
 Bhattacharya, B., *a.*, 15
 Bhattacharya, D. C., *a.*, 31
 Bhattacharya, T., *a.*, 385, 413, 466
 Bhattasali, N. K., *a.*, 192
 Bhaṭṭasvāmin, commentator, 68
 Bhaṭṭotopala, commentator of Varāhamihira's
 works, *Vide* Utpala below
 Bhau Daji, *a.*, 8, 9, 36
 Bhava, year, 490
 Bhavabhūti, playwright, 62
 Bhavaketu, comet, 361
Bhāvaprakāśa, *t.*, 261
 Bhāvaratna, commentator of *Jyotiṛvidābharaṇa*,
 3, 4
Bhaviṣya-purāṇa, *t.*, 14, 17, 142, 403, 416, 424
Bhaviṣyottara-purāṇa, *t.*, 174
 bheda, division, 43
 Bhedana, planetāry conflict, 447, 464
 Bhekṣāṇa, *p.*, 249
 Bhilla (*v. l.* Bhalla), *p.*, 72
 Bhīmarathā (*v. l.* Bhīmarathyā), *r.*, 57
bhinnāñjana, 239
 Bhita seals, 480
 Bhitari pillar inscription of Skanda Gupta, 75
 Bhogaprashta, *l.*, 101
 Bhogavardhana, *l.*, 101
 Bhoja, *a.*, 30, 231, 265, 399
 Bhojaka Brāhmaṇas, 473
 Bhojarāja, *a.*, 8
 Bhramaravilasita, metre, 458
 Bhṛgu, sage, 162
 Bhṛgu, astrologer, 439, 462
bhṛṅgāra, 242, 265, 344, 368, 374
 Bhṛṅgarāja, god, 391
 Bhṛṅgi, *p.*, 70
 Bhṛśa, god, 391
bhūcārin, a class of animals, 294
 Bhujaga, deity, 391
 Bhujāṅgaprayāta, metre, 458
 Bhujāṅgavijṛmbhita, *do.*, 458
 Bhumara pillar inscription of Hastin and
 Śarvanātha, 489-90
bhūmi, 383, 398, 414
bhūmiśaya, animals, 295
bhūṣaṇa, ornaments, 225
 Bhūta, demi-god, 129, 159, 195, 226, 404
 Bhūtapura, *l.*, 101
 Bhuvaneśvara inscription of Narasimha I, 97
 Bidya Binod, *a.*, 192
 Bihar stone pillar inscription of Skanda
 Gupta, 136, 193
Bijapallavā, *t.*, 3
 Bijaygadh stone inscription, 483
 Bilsad inscription of Kumāra Gupta I, 150
 birds, 297-98
 Biswas, D. K., *a.*, 38
 black magic, 176-77
 Bloch, T., *a.*, 308
bodha, cosmetic process, *p.*, 232, 258
 Bodh-Gaya inscription of Mahānāman, 394
 Brahmā, god, 128, 129, 131-33, 134, 150,
 159, 168, 172, 178, 180, 183, 192, 194,
 199, 359, 360, 375, 418
 Brahmā, supposed author, 436
Brahmabandhu, 204, 246
 Brahmadanḍa, comet, 131
 Brahmagupta, astronomer, 3, 8, 9, 31, 36,
 446, 449, 451, 453, 464, 489
Brahmajālasutta, *t.*, 357, 412
Brahma-Kṣatra, 205
brahmamaṇi, precious stone, 313, 323
 Brāhmaṇas, *Varṇa*, 165, 166, 168, 175, 180,
 182, 196, 197, 202, 203, 204, 206, 232,
 237, 248, 315, 339, 374, 381, 382, 389,
 390, 391, 392, 394, 396, 403, 413

- Brahmānda-purāṇa*, t., 108
 Brahmapura, l., 101
Brahma-purāṇa, l., 193
Brāhmasphuṭasiddhānta, t., 8, 9, 446, 453, 464, 493
Brahmsthāna, 390, 396
brhmatīrtha, 377
brahmavādinī, 212
Brahmayajña, 164
Brahmayatana, Brahmā temple, 132
 Br̥hadratha (also called Śārīgarava), astrologer, 439, 447
Br̥hadvirāhapāṭala, t., 20
Br̥hadyātrā, t., also called *Br̥hadyogayātrā*, *Yakṣeśvamedhīyā Yātrā* and *Mahāyātrā*, 11, 20, 21, 24-26, *Vide* also 158, 173
Br̥hajjātaka, t., also called *Horāśāstra*, 35; composed after *Pañcasiddhāntitā* and before *Yātrā* and *Vivāha*, 34; commented upon by Balabhadra, Utpala, Mahidhara (also called Mahidāsa), Nilotpala and Nityaprakāśa Sūri, 26. *Vide* also 2, 8, 12, 15, 16, 21, 25, 26, 43
Br̥hajjyotiṣa, t., also called *Br̥hmaṇotpattimārtanda*, 41
 Br̥hanmitra, supposed original name of VM, 16-17
 Br̥haspati, preceptor of gods, 132, 172, 462
 Br̥haspati, astrologer, also called Vāgīsa, 15, 61, 439-40, 445, 450, 463, 489
 Br̥hatkṣata, deity, 391
Br̥hat-Pārāśa t., 447
 Br̥hatposhṭha grant of Umāvarman, 105
Br̥hatsamhitā, t., also called *Vārāhī Samhitā*, text edited by H. Kern; edited by Sudhākara Dvivedi with Utpala's commentary; translated into Arabic by Alberuni; translated into English by H. Kern, 21-22, last major work of Varāhamihira, 24-26, contents of, 26-29, extent, 29
 Brown, J. C., a., 351, 252, 393
 Brown, Percy, a., 302, 345, 415, 419
 Buddha, 12, 128, 168, 178, 199, 200, 370
 Buddha nirvāṇa era, 6
 Buddhahatṭa, 312, 313, 315, 316, 317, 319, 320, 329, 351, 352, 353, 355
 Budha Prakash, a., 462
 Buddhism, 178
 Bühler, G., a., 42, 346, 399
 Burgess, Jas., a., 462, 491
 Burnell, A. L., a., 102, 123
 Buzurjmehr, 16, 470
 Caitra, month, 249
 Caitra, year, 311, 489
caitya-vṛkṣa, 180, 240
cakra, 307
cakracara, 303, 304
 Cakrapāṇidatta, commentator of *Caraka-samhitā*, 219, 252, 278
cakravartin, 478
cākrika, 303, 304, 346
 Calaketu, comet, 361, 446
 Caland, W. a., 60
 Cālukya, dynasty, 49, 57, 121, 150, 153
cāmara, 230-231, 374
 Campa, c., 70
camūnātha, office, 480, 485
camūpa, do., 480, 485
camūpatī, do., 480, 485
 Cāṇakya, a., 455
 Chanana, D., a., 347
 Cañcūka (v. l. Campūka), p., 70
 Chanda, R. P., a., 84
 Caṇḍāla, 206, 208, 245, 247
 Caṇḍeśvara, a., 43, 313, 351, 353
 Candra, k., 11, 69
 Candrabhāgā, r., 57
 Candragomin, a., 116
 Candragupta Maurya, k; 18, 271
 Candra Gupta II Vikramāditya, k., 11, 15, 34, 69, 91, 371

- Candrapura, *l.*, 101
candraśālā, 401, 421, 422
 Candraśekhara, *a.*, 23
 Canopus, 323, 362, 437
cara, office, 481
 Caraka, *a.*, 220, 237, 269, 270, 293, 295, 324, 325, 332
Caraka-saṃhitā, *t.*, 12, 215, 218, 219, 220, 238, 251, 252, 254, 261, 278, 324, 332, 354
 Carakī, demoness, 160, 389
 caravan trade, 308
 Carlleyle, A.C., *a.*, 134
 Carmadvīpa, *c.*, 70
 Carmaraṅga, *p.*, 70
 Cārudevī, *r.*, 57
catūkāra, necklace, 229
 Caturaśra, comet, 132
 Catuasra, temple, 399, 402, 422
Caturbhāṇi, monologue, 137, 246
caturtha (ka), coin, 329, 355
cāturvedya, Brāhmaṇas, 204
Caturviṃśati-prabandha, *t.*, 18, 475
 Catuṣkoṇa, temple, 399, 402
catuśśālaka, houses, 387, 391, 415
 Catuṣṣaṣṭpada, plan, 390
 Cedi, *c.*, 70-71
 Cerya, *p.*, 71
 Ceryāryaka, *p.*, 71
 Chakladar, H. C., *a.*, 250, 466
 Chanda, R. P., *a.*, 185n.
Chandoga, Brāhmaṇas, 204
Chāndogya Upaniṣad, *t.*, 356
Chandonuśāsana, *t.*, 459
Chandovicitī, *t.*, 467
chardi, vomiting, 219
 Chatra, umbrella, 231-32
 Chavannes, *a.*, 95
Chāyādhikāra, *t.*, 23
chāya-yantra, 243
 chowries, 230-31
 Christensen, A., *a.*, 476
cibuka, 407, 425
 Cina, *p.*, 71, 361
 Cintāmaṇi, Utpala's commentary on *BJ*, also called Jagaccandrikā and Vivṛti, 21
 Cipiṭanāsika, *p.*, 71
 Cīranivāsin, *p.*, 71
 citra-bhāṇḍ, 242
 Citrabhānu, year 490
 Citrakūṭa, *m.*, 51
 Citrā, *nakṣatra*, 146, 162, 200, 237, 489
Citra-karma, painting, 412
Citra lakṣaṇa, *t.*, 454, 482-486
citra-śālā, 402
 Clothes, beliefs about, 371-72
 clouds, classification, 502
 pregnancy, 496
 Cokṣa, Vaiṣṇava ascetic, 137-38
 Cola, *c.* & *p.*, 71, 361
cola, incense, 310
 Colebrooke, H. T., *a.*, 8, 10, 31, 32, 35
 comets, 361
 conception, 222
 Coomaraswamy, A. K., *a.*, 149, 190, 195, 418, 421
 Cosmas Indicopleustes, *a.*, 300, 307, 309, 311, 312, 343, 350
 countries, 64-100
 crops, 268; classification, 269; failure, 271
 crown prince, 231, 256
Cullavagga, *t.*, 323, 345
 Culli, house, 387
 Cunningham, A., *a.*, 50, 52, 59, 60, 68, 69, 76, 91, 96, 101, 103, 105, 110, 394, 397
Cūrṇā, pearls, 320
 Curtius, Q., *a.*, 158
 Cyrus I, *k.*, 5, 470
 Cyrus era, 5
 Cyavana, sage, 163
 Dachinabades = Dakṣiṇāpatha, 49

- dadhibhakta*, 214
 Dadhīci, sage, 313
dadhyodana, 214
dadrū, skin-disease, 219
 Daftari, K. L., a., 34
Dagārgala, 510, 513
 Dahana, god, 144
 Daitya, 195
Daivajña-vallabhā, t., 23, 38
daiṣṭa-yātrā, 169-70, 199, 364
Dakārgala, 444, 491, 509
 Dakṣa, sage, 162
 Dakṣiṇāpatha, territory, 18, 47, 48, 49, 59, 63, 79, 89, 91
 Ḍalhana, commentator of *Suśruta-saṁhitā*, 214, 215, 252
 Ḍāmara, p., 71-72
daṁdānī damanī, 265
 Dāmodara, god, 133, 135, 176
 Dāmodara Daivajña, a., 41
 Dāmodaragupta, a., 138
 Damodarpur copper-plate inscriptions, 79, 305, 308, 350
daṁṣṭrin, animals, 294
 Dānava, 195
daṇḍa, measure, 327, 328, 354, 501
Daṇḍa, appearance of moon, 359, 362
daṇḍa, a meteorological phenomenon, 376
Daṇḍa, house, 388
 Daṇḍaka (also Daṇḍakāvana), forest, 62
daṇḍanāyaka, office, 231, 480
 Daṇḍanīti, 243, 456, 477
 Daṇḍapiṅgalaka, p., 72
 Daṇḍin, poet, 94
dantakāṣṭha, tooth-sticks, 237-38
 Danturaka, p., 72
 Danu, 157
 Darada, p. & c., 72
 Dardura, m., 51
 Dārva, c., 72
Daśācintāmaṇi, t., 24
Daśādhyāyī, commentary on *BJ*, 2, 21
Daśakumāracarita, t., 92, 94, 263
 Dāsameya, p., 72
 Daśapura, l., 16, 101, 440
 Daśaratha, 136, 137, 405, 424
 Daśārṇa, c., 72
 Dāś(s)eraka, p. & c., 72
 Dasgupta, K.K., a., 68, 80, 81, 84, 106-107
 Dauvarika, deity, 391
 Davar, F.C., a., 475
dehalī, 413
 demi-gods, 159-60
 demonology, 160-61
 Deo, S.B., a., 101
 Deo-Barnark inscription of Jivitagupta II, 58, 143
 Desai, Kalpana, a., 473
 Desai, V.B. a., 351, 352,
 desertion, 211
devacchanda, necklace, 227
 deva-dīpta, 372
devāgāra, shrine, 394
devagrāha, do., 391, 394
 devakula, do., 394
 Devala, astrologer, 439, 450, 462, 465, 495, 504, 508
 devālaya, shrine, 392
devara, 243
 Devasvāmin, astrologer, 455, 466
devetā yatana, shrine, 394
devayonis, demi-gods, 159-160
 Devī, 478, 484
 Devikā, r., 57
 Dey, A. K., a., 351, 352, 353
 Dey, N. L., a., 52, 54, 72, 77, 85, 93, 95, 98, 105, 106, 110, 111, 112, 113, 114, 116, 117, 118, 121, 122, 125
 Dhaivata, musical note, 28
 Dhanada, god, 145
 Dhaneśa, do., 145
 Dhaneśvara, do., 145

- Dhaniṣṭhā, *nakṣatra*, 162, 237, 437, 445, 461, 464, 489, 491, 492, 514
dhanus, measure, 327, 328, 354, 505
 Dhanuṣmān, *m.*, 52
 Dhanvantari, *a.*, 32
Dhanvantariya Nighaṇṭu, *t.*, 69
dharaṇa, weight, 316, 319, 320, 325
 Dharmapāta, *k.*, 20
 Dharmapaṭṭana, *l.*, 101-102
 Dharmāraṇya, forest, 63, 113
 Dharmasāstras, 176
 Dhātṛ, god, 131
 Dhātupāṭha, *t.*, 137
 Dhavale, D.G. *a.*, 37
 Dhavalikar, M. K., *a.*, 474, 476
 Dhiṣṇya, deity, 161
 Dhṛti, goddess, 157
Dhruvaketu, comet, 361
dhruvāvarta, 297
 Dhulev plate of *Mahārā Bheṭṭi*, 490
Dhūmaketu, comet, 361
dhūmini, 372
Dhundhuka, hole, 263
dhūpa, incense, 234
 Dhūrṭaviṭa-saṁvāda, *t.*, 253
 diamond, provenances, 313-315; sources, 315; prices, 315-316; qualities and defects, 316-17; beliefs, 317
digdāha, 363, 498
 Digīśa (also Digīśvara and Diṇnātha), guardian of quarters, 158
 Dikshit, G.S., *a.*, 476
 Dikshit, K. N., *a.*, 128, 180, 350, 402
 Dikshit, S. B., *a.*, 4, 7, 8, 9, 22, 31, 35, 36, 452, 464, 465, 489, 492, 493, 494
 Dikshit, S. K. *a.*, 4, 33, 34, 39, 96, 122
 Dikshitar, V.R.R., *a.*, 485
diṇḍibhāṇḍa, 412
dīpta, 372, 373
 Dīrghagrīva, *p.*, 72
 Dīrghakeśa, *p.*, 73
 Dīrghāsya, *p.*, 73
 Dīrghatapas, sage, 162
 diseases, 218
 Diti, 157, 195, 391
divasacara, diurnal animals, 294
divāsañcara, *do.*, 294
divira, 346
 Diviṣṭha, *p.*, 51, 73
Divyāvadāna, *t.*, 48, 513
 Domba, 206
 domestic animals, 296-97
 Dothaka, metre, 458
 Dramaḍa (also Draviḍa), *p. & c.*, 73
 Drāviḍa measure, 407, 424, 454
 Dravyavardhana (*Mahārājādhi rājaka*), *k.* and *a.*, 15-16, 439, 440-41, 462
 dress, 224
Dṛgargala, *t.*, 510
droṇa, cloud, 502, 503
droṇa, measure, 326, 504, 505, 508
 Drutapada, metre 458
dukūla, 223, 255
 Dundubhi, year, 490
 Dūrmati, *do.*, 490, 491
 Durmukha, *do.*, 490
 Durvāsas, sage, 163
dūṣikā, 426
Duṣṭalāṅgala, 345
dūta, office, 380, 481
 Dutt, B.B., *a.* 22
 Dvaipāvana, *a.*, 11
 Dvaipāyana, sage, 163
 Dvijāti, 245
Dviḥja-Kṣatra (also *Dviḥja-Kṣatriya* and *Dviḥja-nṛpati*), 205
dvīpa, 45
dvīpada, 396
 Dvīpas, 73
dviśālaka houses, 388
 Dvita, sage, 162, 163
Dvivajraka, column, 385, 386

- Dvivedi, Sudhakara, *a.*, 4, 12, 20, 21, 29, 31, 108, 112, 125, 149, 255, 258, 339, 390, 426, 439, 460, 494
 dyed clothes, 224-25
dyucara, diurnal animals, 294
- earthquake, 363-64, 437
 eclipse, 311, 359-60, 436-37
 economy, 267-357
 education, 243-44
 Eggeling, J., *a.*, 42
Ekacarana, *p.*, 51, 73
ekadigagra, 241, 263
Ekānāmśā, goddess, 134, 135, 155-56, 239
Ekapāda, *p.*, 51, 73
ekasāla, house, 387
ekaśapha, animals, 293
ekāṣṭipada, plan, 390, 396
Ekata, sage, 162, 163
ekāvalī, necklace, 229, 257
Ekavilocana, *p.*, 51
ekkalaka, 426
 emerald, 175, 323
 Era of Buddha's Nirvāṇa, 6
 Eran pillar inscription of Goparāja, 75, 211
 Eran inscription of Toramāṇa, 185, 394
 erotic remedies, 220-221
Esiagoge, *t.*, 448
esyatsūryā, 372
 etiquette, 245
- Fa-hien, Chinese pilgrim, 92, 247, 307, 311, 318
 family, 243
 famines, 271-72
 fauna, 294-300
 Faustboll, V., *a.*, 513
 Finot, Louis, *a.*; 312, 313, 314, 351, 352, 353
 fires, 165-66
 Fleet, J. F., *a.*, 49, 55, 57, 58, 59, 60, 66, 68, 78, 82, 83, 86, 87, 88, 90, 92, 102, 103, 105, 107, 110, 115, 117, 118, 119, 122, 183, 262, 346
 flora, 277-94
 flowers, 238
 food and drinks, 212-17
 food grains, 212
 food preparations, 214-217
 forests, 62-63
 forts, 481
 fruits, 216
 furniture, 239-42
- Gabhastimān, 45
 Gadhwa inscription of Candra Gupta II, 350
gajādhyakṣa, office, 481
Gajāhvaya, *L.*, 102
Gaja-prṣṭha, temple, 401, 422
galagraha, throat-spasm, 218
Gambhīrikā, *r.*, 57
gaṇa, 477, 483
gaṇa-devatās, 157, 404
Gaṇaka, comet, 132
Gaṇaka-taraṅgiṇī, *t.*, 31, 32, 38, 460
Gaṇarāja, *c.*, 73
Gaṇas, 140
gaṇayāga, 433
Gandhāra, *c.*, 73-74, 109, 370
Gandhāra, musical note, 411, 427, 428
Gandharva, *p.*, 74
Gandharva, territory, 45
Gandharvas, demi-gods, 159, 169, 172, 248, 391, 404
Gandharva-nagara, 362, 363, 364, 431, 498
Gandhasāra, *t.*, 258
gandhayukti, perfumery, 232, 258, 304
Gandhayukti, *t.*, 258
Gaṇeśa, god, 149-50
Ganeśa Daivajña, *a.*, 2
Gaṇḡā, *r.*, 49, 57
Gaṇḡādhara, *a.*, 258
Gaṇḡā-Yamuna Doab, 48, 49

- Gangdhar stone inscription of Viśvavarman, 154, 184
- Gangopadhyaya, R., *a.*, 275, 335
- Ganguli, M. M., *a.*, 418
- Ganguli, R., *a.*, 334
- Gaṇita, branch of Jyotiṣa, 430, 460, 464
- Gara, *karāṇa*, 164, 331
- garbhāgrha*, 396, 397
- garbhadāsa*, 306
- garbha-lakṣaṇa*, 439, 447, 496
- Gardner, P., *a.*, 191
- Garga, *a.*, 6, 15, 32, 34, 47, 107, 108, 109, 129, 181, 360, 415, 430, 433, 435, 436, 437, 438, 441-43, 445, 447, 452, 453, 454, 460, 461, 462, 463, 489, 493, 495, 496, 497, 504, 507
- Gārgī Samhitā*, *t.*, 18, 442, 443, 447, 495
- garlands, 238
- gartākukkuṭa*, cock, 298
- Garuḍa, temple, 399, 401, 421
- Garuḍa-purāṇa*, *t.*, 108
- Garutmān, *a.*, 15, 443, 450, 465
- Gāthā, metre, 458
- gathasaptasatī*, *t.*, 253
- Gauḍaka, *c.*, 74
- Gauragriva, *p.*, 74
- gaurasāli*, paddy, 212, 270
- Gautama-dharmasūtra*, *t.*, 357
- Gautama-smṛti*, *t.*, 247
- Gautamīputra Sātakarṇi, Sātanāhana, *k.*, 53, 119
- Gauthiot, *a.*, 94
- Gavya, *p.*, 74
- Gayā, *l.*, 102, 175
- geography, 44-125, 474, 476
- Getty, A., *a.*, 180
- Ghaṭa*, moulding of column, 384, 385, 386, 414
- Ghaṭa*, temple, 399, 401
- Ghaṭakharpara*, *a.*, 32
- Ghora, Mercury's motion, 437, 464
- Ghoṣa, *c.*, 74
- Ghosh, J. C., *a.*, 156
- Ghosh, N.C., *a.*, 185
- Giles, H. A., *a.*, 247, 353
- gīridurga*, mountain fort, 481
- Girinagara, *l.*, 76, 102
- Gītaka, metre, 458
- Gītyāryā, metre, 458
- Gobhila-grhyasūtra*, *t.*, 414, 416
- Godāvarī, *r.*, 58
- goddesses, 153
- Gode, P. K., *a.*, 41, 258, 261, 275, 335, 340
- gods, Vedic, 127; post-Vedic, 147; Vaiṣṇava, 147; Śaiva, 149; Saura, 152
- Gomanta, *m.*, 52
- Gomatī *r.*, 58
- Gomedaka, precious stone, 313
- Gonanda, *m.*, 52
- Gonarda, *l.*, 102
- Gopa, *p.*, 249
- Gopāla, *k.*, 70
- Gopatha Brāhmaṇa*, *t.*, 120, 474
- Gopīta, wagtail, 298
- goratha*, 316
- Govinda, god, 133, 134, 135, 176
- Goyal, S.R., *a.*, 188, 476
- graha-vipra*, 476
- grāiveyaka*, 230, 473
- Grahasāadhanakoṣṭhaka *t.*, 35
- Grahayajña, 195
- grāmas*, 411
- grāmya* animals, 294
- great men (5), 368-70
- Gṛhacullī, house, 388
- guccha*, necklace, 228, 256
- Guḍa, *l.*, 92
- Guharāja, temple, 399, 401, 422
- Guganna inser. of Meruvarman, 400
- Guhyakas, demi-gods, 159
- guilds, 308-09
- gulma*, disease, 220

- gulma*, a class of flora, 278, 293, 336
 Guluhā (*v. l.* Gulahā, Garuha, Guruhā), *r.*, 58
 Gunda inscription of Rudrasimha I, 64
guñjā, weight, 284, 324, 325
 Guntupalli inscription, 83
 Gupta, Chandra, Shekhar, *a.*, 476
 Gupta, dynasty and age, 1, 4, 11, 150
 Gupta, P.L., *a.*, 99
 Guserwa inscription, 47n.
 Gwalior inscription of Mihirakula, 143, 394

 Haihaya, *p.*, 74
Haima, lexicon, 291
haimakakṣya, ornament, 230, 257
 Haimavratavarṣa, India, 46
 hair bath, 232
 hair dye, 236
 hair oil, 233
 Hala (*v. l.* Laha), *p.*, 74
 Halaḍa (*v. l.* Lahada, Lahare, Laḍaha and Kalaha), *p.* & *l.* in 74-75
 Haladharamiśra, *a.*, 30
Haladhara-saṃhitā, *t.*, 30
 Halāyudha, lexicographer, 513
Halāyudha, lexicon, 412, 513
 Haṃsa, great man, 368, 369, 370, 371, 377, 406
 Haṃsa, bull, 296
 Haṃsa, temple, 399, 401
 Haṃsapura; old name of Multan, 45
 Handa, Devendra, *a.*, 16, 182, 189
 Handiqui, K. K., *a.*, 484
hanu, 407, 425
 Hara, god, 139, 140, 191
hāra, necklace, 227
 Haradatta, Commentator of *Gautama-smṛti*, 247
 Hārāha inscription of Išānavarman, 74, 94, 121
 Hārahaura, *c.*, 45, 50, 75
hāraaphalaka, necklace 228

 Hari, god, 133
 Haricandra, 17, 39
 Hariharan, *a.*, 20
 Hariṇapluta, metre, 458
haritamāṇi, 337
Harivaṃsa, *t.*, 52, 90, 130, 155, 193, 474, 476
Harṣa-carita, *t.*, 75, 89, 109, 174, 189, 192, 200, 209, 248, 250, 251, 254, 256, 257, 265, 343, 345, 466, 484
Harṣa-vikramādityā, *k.*, 15
 Harṣavardhana, *k.*, 7, 49,
 Hasta, *nakṣatra*, 37, 144, 162, 237, 249, 311, 437, 461, 488, 514
hasta, measure, 327, 328, 354, 355, 380, 406, 504
 Hastikhaṇḍā, *l.*, 111
 Hathigumpha inscription of Khāravela, 49, 67, 107
 head-ornaments, 226-27
 health, 218
 Hebbata grant of Kadamba Viṣṇuvarman I, 83
 Hemacandra, *a.*, 89, 96, 124, 459
 Hemādri, *a.*, 251
 Hemagiri, *m.*, 52
 Hemakuḍya (*v. l.* Hemakūṭa, Hemakūṭya, Hemakuṇḍya), *l.*, 102
 Hemalamba, year, 490
 Hemanta, season, 159
 Hematāla, *p.*, 75
 Hermanns, Fr. M., *a.*, 512
 Herodotus, Greek historian, 470
 Himāhva, India, 46
 Himavat, *m.*, 48, 52-53, 296, 313, 314, 315, 317, 319, 478
 Hipparchus, astronomer, 444
 Hiralal, *a.*, 41, 42
 Hiraṇyanābha, house, 387
 historical geography, 44-126
 Horā, *BJ*, 43

- Horā, horoscopy, 430, contents of, 432-33, 443, 459
Horā-pañca-hotṛya, *t.*, 22
Horā-vivaraṇa, commentary on *BJ*, 21
hotṛ, priest, 166, 410
houses, *catuśśālaka*, 387
triśālaka, 387, *dviśālaka*, 388, selection of site for, 386; site-plan, 390
Hṛṣīkesa, god, 133
Hūṇa, *p.*, 75, 207, 249
Hunter, G.R., *a.*, 12
Hutabhuj (also Hutāśa and Hutavaha), god, 144, 165, 491
- Iconography, Indra, 127, Varuna, 131; Brahmā 132-33; Viṣṇu, 139
Śiva, 140; Sūrya, 142-43; Yama, 145; Kubera, 145-46; Baladesa, 147-48; Pradyumna, 148; Śāmba, 149; Gaṇeśa, 149-50; Skānda, 151-152; Revanta, 152-53; Divine Mothers, 154-55; Ekānamśā, 155-56; Wives of Pradyumna and Śāmba, 157; Buddha, 178; Jina, 178-79.
- iconometry, 405-10
Idāvatsara, year, 491
Idvatsara, *do.*, 491
Ikṣumatī, *r.*, 58
ikṣu-vana, 271
ikṣu-vāṭa, 271
Ikṣvāku, *p.*, 75
image-worship, 167-70, 403
incenses, 234-35
India, divisions of, 48-51
indigestion, powder for, 221
Indor copper-plate inscription of Skānda Gupta, 49, 309, 350
Indra, god, 127-28, 130, 132, 136, 144, 146, 157, 158, 160, 161, 162, 167, 168, 171, 172, 173, 176, 179, 180, 182, 225, 230, 239, 258, 280, 307, 315, 336, 360, 363, 370, 390, 391, 404, 442, 443, 471, 476
Indracchanda, necklace, 227
Indradhanus, 363, 364
Indradvīpa, 45
Indrāgnī, gods, 179
Indramaha, 70, 129, 167, 170, 180, 182, 258, 478, 480
Indrāṇī, goddess, 156, 209
Indranīla, sapphire, 313
Indrapura, *l.*, 49
Indravajrā, metre, 458
Indravamśā, *do.*, 458
Indu, moon god, 158
inducchanda, necklace, 227
Indumatī, 469
interstate relations, 479
Irāvati, *r.*, 58
īśā, frame of cot, 241, 263, 264
īśa, god, 139
īśāna, *do.*, 139
Iśānavarman Maukharī, *k.*, 74, 94
iṣṭa, sacrifice, 394
iṣṭi, 165
Iśvara, *a.*, 258
īśvara, *a.*, god, 23
īśvara, year, 490
īśvarakaṣṇa, *a.*, 456
īti, 272, 334
I-tsing, Chinese pilgrim, 312
ivory, 240, 295, 300-01, 310, 455
- Jābāli, sage, 162
Jacobi, H., *a.*, 40
Jagaccandrikā, Utpala's commentary on *BJ* (also called Cintāmaṇi and Vivṛti), 21
Jaghanacapalā, metre, 458
Jaghanya, attendant of Mālavya, 370, 371
Jaigīṣavya, sage, 162
Jaiminibhārata, *t.*, 32
Jaiminīya Brāhmaṇa, *t.*, 60
Jain, J. C., *a.*, 255
Jainism, 178-79

- jalacara* (also *jalacārin* and *jalaja*), aquatic animals, 294
Jalaketu, comet, 361
jalamārga, 308
Jalārgalaśāstra, (same as *Dagārgala*, *Dakārgala* and *Dṛgargala*) *t.*, 28, 510
jalayantra, 243
jaleśvara, epithet of Varuṇa, 131
jalodara, disease, 220
Jambudīva-panṇatti, *t.*, 46
Jambūdvīpa, 45, 54, 108
jāṅgala, wild animals, 295
jaṅghā, 241
jānukapiccha, 426
Jaṭādhara, *p.*, 75
Jātaka, branch of *Jyotiṣa*, 430, 433, 469
Jātakābharāṇa, *t.*, 24
Jātakarma, sacrament, 174, 175
Jātakārṇava-saṅgraha (also called *Chāyādhikāra*), *t.*, 23
Jātaka-vivaraṇa, commentary on *BJ*, 21
Jaṭāsura, *p.*, 76
Jaṭharāṅga, *p.*, 76
Jaṭila, goat, 296
Jayā, 130, 181
Jaya, year, 490
Jayadatta Sūri, *a.*, 297
Jayadeva, *a.*, 459
Jayamaṅgalā, commentary on *Kāmasūtra*, 312
Jayanta, Indra's son, 128, 390, 391
Jayaswal, K. P. *a.*, 67, 103, 123, 352, 483
 jewel industry, 312-24
Jha, Ganganatha, *a.*, 495
Jina, 17, 168, 199
Jinavijaya, *a.*, 476
Jiṣṇu, astrologer, 4, 36
Jolly, J. *a.*, 220, 234
Joshi, M.C., *a.*, 182
Joshi, N. P., *a.*, 188, 264, 476, 487
Jrṅga, *p.*, 76
Julien, M., *a.*, 101
Junagadh inscription of Rudradāman I, 65, 66, 68, 80, 86, 110, 119, 271, 306
Junagadh inscription of Skanda Gupta, 55, 136, 182
Junnar inscriptions, 349
Jupiter, 161, 168, 195, 334, 336, 360, 361, 366, 376, 404, 423, 499; twelve-year cycle of, 488-90; sixty-year cycle of, 490-92
jvara, fever, 220
Jyaiṣṭha, year, 489
Jyeṣṭhā, *nakṣatra*, 127, 162, 177, 237, 331, 359, 462, 489, 499
jyotirasa, precious stone, 313, 323
Jyotirvid-ābharāṇa, *t.*, 3-4, 32, 33
Jyotiṣa, 430
Jyotiṣa-darpaṇa, *t.*, 489
Jyotiṣa-ratnamālā, *t.*, 2, 32
Jyotiṣa-kaumudī, *t.*, 23
Jyotiṣārṇava, *t.*, 23
jyotiṣa-saṅgraha, *t.*, 430
Jyotiṣa-tattva-kaumudī, *t.*, 2, 30, 32
Jyotiṣa Vedāṅga, *t.*, 442, 445-46
Jyotiścandrodaya, *t.*, 30
Ka, comet, 361
Kāca, house, 388
Kaccha, *p.* and *c.*, 50, 76
Kacchāra, *p.* 76
kācchika, perfumer, 232, 304
Kādambarī, *t.*, 247, 250, 257
Kadrū, 157
Kaikaya, *p.*, 76
Kailāsa, *m.*, 53
Kailāsa, temple, 399, 400, 421
Kailāvata, *p.*, 76
Kajaṅgala, region, 48
kākiṇī, coin, 329, 355
kakṣyā, 324
Kālājina (*v. l. Kālāñjana*), *l.*, 102
Kālaka, forest, 48

- Kālaka*, hole, 263
Kālaka, *p.*, 76
Kālakoṭi, *l.*, 102
kalamaśāli, paddy, 212, 269-70, 332, 362
Kāla-puruṣa, astrology, 358, 455
Kalayukta, year, 490
Kalhaṇa, chronicler, 7, 34, 496, 502
Kali era, 3, 4
Kālidāsa, poet, 3, 32, 51, 53, 54, 55, 57, 59, 89, 94, 98, 100, 136, 137, 151, 169, 170, 209, 211, 226, 227, 229, 257, 263, 264, 276, 288, 290, 292, 310, 318, 352, 496, 502
Kālīka-purāṇa, *t.*, 192
Kaliṅga, *c.*, 45, 54, 76, 292, 310, 313, 314, 315
Kalmāśa, *p.*, 77
Kalpasūtra, *t.*, 18
Kalyāṇavarman, astrologer, 2, 31
Kāma, god, 39, 139, 148
kaṃala, moulding of column, 384, 414
kāmala, jaundice, 219
Kamalaja (also *Kamalayoni*), god *Brahmā*, 132
Kamalanābha, god *Viṣṇu*, 134
Kāmandakīya-nītisāra, *t.*, 357, 466, 478, 480, 483, 484, 485, 486
Kāmarūpa, *c.*, 10, 47, 223, 310
Kāmasūtra, *t.*, 10, 93, 170, 210, 221, 250, 254, 261, 272, 335, 351, 435, 456
Kāmboja, *c.*, 70, 77, 93
Kāmikāgama, *t.*, 415
Kaṇabhuj, founder of *Vaiśeṣika*, 457
Kanaka, *p.*, 77, 91
Kāñci, *l.*, 17, 110
Kāñcā, zone, 229
Kāñci-kalāpa, *do.*, 229
kañcuka, 143, 224
kañcukin, office, 380, 481
kāṇḍarpika, erotic remedies, 220-21, 450
kāṇḍa-roṣya, 275
Kane, P. V., *a.*, 17, 22, 35, 180, 442, 443, 444, 446, 455
kaṇḍu, paddy variety, 270
Kanheri inscriptions, 110
Kaṇka, comets, 131
Kaṇka, *p.*, 77
Kaṇkaṇa, *p.*, 77
Kaṇkaṭa, *p.*, 77
Kaṇṭakasthala, *l.*, 103
kaṇṭakin, plants, 278, 336
Kaṇṭhadhāna, *p.*, 77
Kantipura, *l.*, 103
Kaṇva, sage, 162
Kanyā, *rāśi*, 249
Kapālaketu, comet, 361
Kāpāla-vrata, 204-05, 246
Kāpālika, Śaiva sect. 141-42, 187
Kapila, *p.*, 77
Kapila, founder of *Sāṅkhya* system, 457
Kāpiṣkala, 12
Kapiṣṭhala, *a.*, 443, 450, 465
Kapiṣṭhala (*v. l.* *Kapiṣṭhaka*), *l.*, 13, 103
Kapitha, *l.*, 13
Kāpittha, *l.*, 13
Kapittha agraḥāra, 19
Kāpitthaka (*v. l.* *Kāmpilyaka*, *Kāmpillaka*, *Kāpiṣkala* and *Kāpiṣṭhala*), *l.*, 12-13, 38
kaṇṇapālī, 398
Kar, R. C., *a.*, 377
Karambelkar, V.W., *a.*, 41, 35
karaṇa, astronomical manual, 7, 9, 373, 431
Karaṇa = *PS*, 24, 431, 451, 465
Karaṇāgama, *t.*, 405
Karaṇa-kutūhala, *t.*, 9
karavīra, 408, 426, 486
Karkala inscription of *Bhairava II*, 402
Karkaṭaka, *rāśi*, 358
karketana, 313
Kārmaṇyaka, *l.*, 103
karmāṅgula, measure, 263, 327, 328, 354
karmāntādhyakṣa, office, 381, 480
Kārmuka, lunar appearance, 359
Karṇaprāveya (*v. l.* *Karṇaprādeya*, *Karṇa-prāvanā*), *p.*, 77

- Karṇāṭa, *c.*, 77
Karṇavedha, sacrament, 174
kārpāsika, cotton cloth, 223
karṣa, weight, 322, 325
kārṣāpaṇa, coin, 316, 319, 320, 329-31, 350, 355
 Kārttika, year, 488, 493
 Karvaṭa, *p.*, 77
kāsa, cough, 219
kāśāyin, ascetic, 207, 225
 Kaserumān, *m.*, 45
 Kāśī, *l.*, 103, 223
 Kāśī-deśa, *c.*, 103
Kāśikā, *t.*, 67
 Kāśirāja, 455, 466, 478, 484
 Kaśmīra *c.*, 77-78
 Kasu Caidya, *k.*, 70
 Kaśyap Jagadish, *a.*, 262, 331
 Kaśyapa, sage, 157, 162, 359, 375
 Kaśyapa, astrologer, 143, 149, 151, 183, 277, 395, 400, 401, 403, 420, 421, 422, 423, 424, 426, 435, 436, 437, 439, 443, 460, 461, 462, 493, 495, 496 504, 507
 Kaśyapapura, old name of Multan, 45
Kāśyapa-saṁhitā, *t.*, 513
Kathāsaritsāgara, *t.*, 74, 86, 121, 396, 419
 Katre, S. L., *a.*, 31
 Kātyāyana, sage, 162
 Kaubera, *l.* or *c.*, 78, 317, 319,
Kauberī, north, 145, 158
 Kaulava, *karaṇa*, 146
 Kauṇapadanta, *a.*, 16
 Kauśāmbī, *l.*, 103
kauśeya, silken cloth, 223, 255
Kauśika Sūtra, *t.*, 129, 181
 Kauśikī, *r.*, 58
Kaustubha, gem, 138
Kauṭīliya (=Arthaśāstra), *t.*, 10, 325, 381, 455
 Kauṭīliya, *a.*, 10, 74, 170, 215, 223, 227, 228, 229, 252, 256, 272, 295, 312, 314, 317, 323, 325, 326, 327, 328, 331, 351, 352, 357, 377, 455, 480, 482, 496, 499, 503, 504, 505
kautuka-maṅgala, 209, 248
 Kāverī, *r.*, 55, 58
Kavi-kaustubha, *t.*, 22
Kāvya-mīmāṃsā, *t.*, 45, 49, 107, 109, 110
Kāvya-prakāśa, *t.*, 29
kāyastha, office, 305, 346, 481
 Kāyathā, *l.*, 13
 Keith, A. B., *a.*, 4, 10, 30, 33, 37, 43, 120, 462, 464
 Kekaya, *c.*, 78
 Kerala, *c.*, 30, 78
 Kern, H., *a.*, 4, 8, 14, 21, 29, 37, 43, 48, 58, 63, 65, 68, 69, 71, 73, 77, 78, 79, 82, 85, 86, 87, 88, 90, 91, 92, 95, 98, 99, 100, 103, 104, 106, 107, 108, 111, 112, 113, 118, 121, 122, 123, 149, 197, 215, 252, 385, 425, 426, 443, 444, 447, 448, 454, 460, 462, 463
 Kero Pant, *a.*, 35
 Keśadhara, *p.*, 78
 Keśava, god, 133, 135, 170
ketus, comets, 158, 358, 361-62, 404, 441, 445, 446, 452, 463
keyūra, armlet, 230
 Khacara, *p.*, 51, 73, 78
khalati, baldness, 220
 Khalimpur plate of Dharmapāla, 70
 Khan, M. A. Waheed, *a.*, 148, 149, 190
 Khānā, 19
khaṇḍa, 45
Khaṇḍa, *p.*, 78
Khaṇḍakhādya, *t.*, 8, 34, 460
 Khara, year, 489
 Khāravēla, *k.*, 49, 76, 107
 Khare, G. H., *a.*, 183, 190, 193, 195
 Khaśa, *p.*, 78, 249, 370
 Khastha, *p.*, 51, 73, 78
 Khoh plate of Mahārāja Hastin, 489, 493

- Khoh plate of *Mahārāja* Saṅkṣobha, 489, 490
 Khoh plate of *Mahārāja* Śarvanātha, 189
khura, 241
 Khusrau Nushirvan, King of Persia, 10, 16
 Kielhorn, F., *a.*, 41, 352
 Kīlaka, year, 489
 Kīmstughna, *karaṇa*, 146
 king, 476
 Kinnaras, demi-gods, 68, 159
 Kīra, *p.*, 78
Kiraṇākhyatantra, *t.*, 385, 386
 Kirāta, *p.*, 45, 71, 78-79
 Kiriṭa, 226
 kirtana 175-76
 Kīrti, goddess, 157
 Kiṣkindhā, *m.*, 53
kodrava, paddy variety, 270, 333
 Kohala, *p.*, 79
kotākṣa, hole, 263
 Kollagiri, *l.*, 103
 Komarti plates of Caṇḍavarman, 105
 Koṇkaṇa, *c.*, 79
kopacchada, perfume, 235
kośa, 482
Kośa-bhavana, 381
kośa-dhānya, 269
 Kosala (*v. i.* Kohala), *c.*, 79, 313, 314, 315, 352
kośeśa, office, 480
 Kot stone inscription, 494
Koṭihoma, a *śānti*, 174, 200
 Koṭivarṣa, *c.*, 79, 308, 309
 Kramrisch, Stella, *a.*, 399, 416, 420, 421, 422
kratu, sacrifice, 164, 165
 Kratu, sage, 162
 Krauñca, *m.*, 53
 Krauñcadvīpa, *c.*, 79
kravyād, carnivorous animals, 294
 Kravyāda, *p.*, 79
 Kravyāśin, *p.*, 79
 Krishna Kumar, *a.*, 193
kriyā-dīpta, 372
 Krodha, year, 490
 Krodhin, *do.*, 490
 Krośa, measure, 355
 Kṛṣi-Parāśara (also called *Kṛṣi-paddhati* and *Kṛsi-saṅgraha*), *t.*, 496, 500, 501, 502, 505, 506
 Kṛṣṇa, *a.*, 31
 Kṛṣṇa, deified Vṛṣṇi hero, 134, 135, 136, 142, 147, 155, 156
 Kṛṣṇā, *r.*, 111
kṛṣṇala (same as *guñjā*), weight, 284, 319, 324, 325, 329, 355
 Kṛṣṇvellūra, *l.*, 103
 Kṛttikā, *nakṣatra*, 46, 144, 162, 361, 488
Kṛtya-ratnākara, *t.*, 180
kṛtyā, 177, 200
kṣapāccra, nocturnal animals, 294
 Kṣapaṇaka, *a.*, 32
 Kṣatra, 205, 246
 Kṣatriya, *varṇa*, 165, 197, 202, 203, 205, 247, 248, 315, 381, 382, 389, 403, 413
kṣayamāsa, 4
kṣaudra, honey, 213
kṣauma, linen cloth, 223, 255
kṣaya, consumption, 219
 Kṣaya, year, 490
 Kṣemadhara, *p.*, 80
 Kṣemendra, *a.*, 28
kṣepaka, 6, 7, 9
 Kṣīrasvāmin, commentator of *Amarakośa*, 101, 224
kṣīrataru (also *kṣīrin*), milky trees, 278
kṣīraudana, 274
 Kṣīroda, milk ocean, 64
kṣudradhānya, 333
kṣudrajnatu, animals, 295
 Kṣudramīna, *p.*, 80
kṣuṣa, 278
 Kṣurārpaṇa, *m.*, 53
kṣvedā, 245, 266

Index

- Kubera, god, 145-46, 158, 189, 226, 336, 360, 404
 Kubja, elephant, 295
 Kubja, attendant of Haṁsa, 258, 370, 371, 377
 Kucika, *p.*, 80
kuḍava, measure, 326
kuhaka, 177, 210, 244, 375
kuhara, 420, 421
 Kuhū, moonless Amāvāsyā, 162
kukṣya, 241
 Kukura, *c.*, 80
kulāla-kukkuṭa, cock, 298
 Kula-parvata, 45, 56
 Kulinda (same as Kuṇinda), *c.*, 80
kuliśabhṛt (also *kuliśadhara*), epithet of Indra, 180
 Kullūka, commentator of *Manusmṛti*, 254
 Kulūta, *c.*, 80-81
 Kumāra, a person, 22
 Kumāra, ancient name of India, 45
Kumāra-sambhava, *t.*, 3, 53, 151, 250, 264, 330
 Kumārasimha, astronomer, 3
 Kumārī-dvīpa, 45, 47
kumbha, 241
 Kumbha, *rāśi*, 334
Kumuda, comet, 361
 Kumuda, water-vein, 510
Kuṇḍa, lunar appearance, 359
kuṇḍala, ear-ring, 229
 Kuṇinda *p.*, 45, 80
 Kuṇjara, temple, 399, 401
 Kuṇjaradrī, *l.*, 103-104
 Kuntala, *c.*, 81
 Kuntibhoja, *p.*, 81
kūrma, 46
kurma-cakra, 46-47
kūrma-vibhāga, 46-47
 Kuru, *p.*, 7, 81-82
 Kurubhūmi, *c.*, 81
 Kurujāṅgala, *c.*, 81
 Kurukṣetra, *c.*, 81
kuruvinda, 303, 322
 Kuṣāṇa, dynasty, 11
kuṣṭha, leprosy, 219
 Kusumadanta, deity, 391
 Kusumanaga, *m.*, 53
kutha, 308
Kuṭṭanīmata, *t.*, 138
kutupa, 223, 254
 Kuṭila, goat, 296
 Kuṭṭaka, *do.*, 296
Kutūhala-maṇjari, *t.*, 3, 4, 34
 labour, 306
laḍḍuka, 214
Laghūjālaka, also called *Svalpa*- and *Sūkṣma-jātaka*, 21, commented upon by Utpala, 27, 35; translated into Arabic by Alberuni, 27. *Vide* also 16, 20
Laghumānasa, *t.*, 8, 21
Laghu-Pārāśarī, *t.*, 447
Laghu-Saṁhitā, *t.*, 16
Lahiri, *Bela*, *a.*, 80
lakṣaṇa, 366, 367
 Lakṣmī, goddess, 157
 Lakṣmī, metre, 458
 Lalita, *do.*, 458
 Lalitapada, *do.*, 458
Latita-vistara, *t.*, 232
Lalla, *a.*, 32
Lāṅgala, lunar appearance, 359
 Laṅkā, *l.*, 17, 82
 Lassen, *a.*, 58, 88, 100, 121
 Lāṭa, *c.*, 82, 369
latā, 278
 Lāṭadeva (also (Lāṭācārya), commentator of *Romaka* and *Paulīśa Siddhāntas*, 431, 448, 449, 451
 Laufer, B., 454
 Lauhitya, *r.*, 58-59
 Laukāyatika system, 457

- Law, B.C., *a.*, 54, 69, 71, 89, 108, 109, 112, 117, 119, 122
- Lévi, S., *a.* 88, 90, 95, 116, 123
- likṣā*, measure, 327, 328, 354
- liṅga*, measurement of, 140
- literature, on Jyotiṣa, 430; architecture and sculpture, 453; Daṇḍanīti, 455; erotics, 456; philosophy, 456; religion, 457; metrics, 458
- localities, 100-107
- loha*, 345
- Lokapālas, 128, 130, 144, 145, 146, 158, 161, 172
- Lokāyata sect, 178
- Lokeśvara, *a.*, 258
- Longhurst, A. H., *a.*, 111
- loṭikā*, 212
- Macdonell, A.A., *a.*, 120, 179, 182, 183, 185, 189, 194, 195
- Mādhava, god, 133, 176
- Madhu, demon, 134
- madhu*, honey, 213
- mudhuparka*, 199, 209
- Madhusūdana, god, 133, 134, 176
- Madhvācārya, *a.*, 187
- Madhyadeśa, territory, 45, 46, 47, 48, 49, 50, 61, 62, 68, 70, 74, 77, 81, 84, 85, 86, 87, 91, 92, 94, 96, 97, 98, 102, 103, 104, 106, 109, 369, 371
- Madhyama, musical note, 411, 427, 428
- Madhyamikā, *l.*, 104
- Madhyavidaraṇa, eclipse, 436
- Madra, *c.*, 45, 82
- Maga, Magi priests, 13-14, 17, 142, 168, 207, 470, 471
- Magadha, *c.*, 14, 45, 48, 49, 82, 223, 471
- Magadha-dvijā*, 13
- Magadha-māna*, 324, 326, 504
- Māgadhi, metre, 458
- Maghā, *nakṣatra*, 8, 43, 159, 162, 249, 359, 452, 488, 498, 514
- Māgha, year, 175, 311, 488
- Maghavan, Indra, 127
- Mahābhārata*, great epic, 10, 35, 51, 53, 54, 60, 62, 63, 64, 65, 66, 69, 70, 77, 81, 82, 86, 93, 94, 95, 98, 100, 103, 107, 115, 118, 120, 129, 130, 136, 167, 176, 180, 186, 194, 200, 206, 249, 342, 345, 360, 375, 428
- Mahābhārata war, date of, 6-7
- Mahābhāṣya*, *t.*, 48, 98, 102, 121, 191, 331, 418
- Mahāgrīva, *p.*, 83
- Mahākūṭa pillar inscription of Maṅgaleśa, 492
- Mahalingam, T.V., *a.*, 123
- māhamātra*, office, 480, 485
- mahāmātya*, *do.*, 480, 485
- Mahāmāyūrī*, *t.*, 76, 88, 98, 99, 118
- Mahānadī, *r.*, 59
- mahānīla*, precious stone, 313, 323
- mahārājādhirājaka*, title, 440, 479
- Mahārāṣṭra, *c.*, 47, 83, 108
- Mahārṇava, Indian Ocean, 63
- Mahāśīrā, water-spring, 510
- Mahāsthan stone plaque inscription, 90
- Mahāṭavi, forest, 62
- Mahāūmmagga-jātaka*, *t.*, 190
- Mahāvagga*, *t.*, 48, 262, 345
- Mahāvamsa*, *t.*, 105
- Mahāvrata hymns, 500
- Mahendra, god, 127, 128, 179
- Mahendra, *m.*, 46, 53-54
- Mahendravarman, Pallava king and playwright, 141
- Māhendrī, goddess, 156
- Mahī, *r.*, 59
- Mahīdāsa, 21. See Mahidhara below.
- Mahīdhara, Vedic commentator and commentator of *BJ*, 12, 21, 25, 86
- Mahiṣa, *c.*, 87-88
- Mahiṣmatī, *l.*, 49

Index

- Maitraka dynasty, 16
 Maîtreya, Buddhist deity, 11
 Maity S. K., a., 332
 Majhgavan plates of *Mahārāja* Hastin, 489
 Majumdar, G. P., a., 275, 292, 335, 336
 Majumdar, N. G., a., 109, 124
 Majumdar, R. C., a., 156, 184
 Makara, *rāśi*, 334, 358
mākṣika, honey, 213, 297
 Mālaka, p., 249
 Mālatī, metre, 458
 Mālatī, r., 59
Mālatī-Mādhava, play, 248
 Mālava, p., 83-84, 249, 369
Mālavikāgnimitra, play t., 248, 292
 Mālavya, great man, 84, 368, 369, 370, 371, 377, 406
 Malaya, m., 46, 51, 54
malaya (also -ja), sandal-wood, 283, 309
 Mālindya, m., 54
 Mālinī, metre, 458
 Malla, p., 84
 Mallikākṣa, horse, 296, 339
 Mallinātha, commentator, 353
 Mālyavān, m., 54
 Mammaṭa, a., 29
māmsaudana, 214
 Māṇahala, p., 84
Mānasāra, t., 226, 241, 390, 393, 412, 415, 416, 417
Mānosollāsa, t., 235, 260, 337
Mānava-dharmasūtra, t., 200, 205
Mānava-gr̥hyasūtra, t., 150
Mānava-vāstu-lakṣaṇa, t., 463
māṇavaka, necklace, 228, 256
 Manda, elephant, 295
 Mandākinī, r., 59
 Mandākrāntā, metre, 458
 maṇḍala, 479
 maṇḍalāgra, sword, 482, 487
 Maṇḍalaka, attendant of Rucaka, 204, 370, 371
maṇḍalakrama, Tāntric mode of worship, 154, 168, 192, 199
māṇḍalika, 369
māṇḍalika, feudatory chief, 242, 264, 479
 Mandara, temple, 394, 400
mandara, necklace, 228
 Mandasor, l., 16
 Mandasor inscription of Kamāra Gupta and Bandhuvarman, 53, 112, 143, 262, 309, 394
 Mandasor inscription of Naravarman, 180
 Mandasor inscription of Yaśodharman-Viṣṇuvardhana, 111, 141
 Māṇḍavya, a., 244, 265, 459
 Māṇḍavya, p., 84, 249
 Manctho, a., 438
 maṇibandha, 377
 Maṇiguṇanikara, metre, 458
 Maṇiketū, comet, 361
 Maṇimān, m., 54
maṇisopānaka, necklace, 228-29
 Maṇittha, astrologer, 3, 438
 Manmatha, year, 490
Mantramahodadhi, t., 21
mantrin, office, 480
 Mantriṣika (v. l. Maṁtriṣikha, Matriṣika, Māhiṣaka, Māmyūsika, Pārasika) p., 84
 Manu, *dharmaśāstrakāra*, 2, 11, 48, 49, 60, 81, 204, 206, 208, 210, 246, 278, 321, 329, 349, 354, 357
 Manu, astrologer, 443-44, 454
 Manu, Daṇḍanīti of, 456, 466
Manusmṛti, t., 16, 177, 194, 200, 205, 208, 222, 246, 247, 248, 250, 254, 265, 266, 325, 336, 346, 355, 375, 416, 428, 456, 457, 484, 485, 486
Marakatra, emerald, 313, 323
 Marco Polo, a., 353
 Mārgara, p., 85
 Mārgaśīrṣa, year, 488
 Marici, sage, 167

- marital rites, 209
Mārkaṇḍeya, sage, 162
Mārkaṇḍeya-purāṇa, t., 46, 47, 51, 53, 69, 77, 98, 101, 102, 107, 108, 110, 112, 119, 153, 154, 155, 192, 265
Markaṭa, *rāśi*, 311
marriage, 207-12
Mars, 166, 249, 281, 311, 334, 336, 360, 361, 368, 376, 404, 437
Marshall, Sir John, a., 487
Martin, M. Vivien de Saint, a., 95, 124
Mārtikāvata, p., 85
Maru, c., 85
Marucipaṭṭana, l., 104
Marudgaṇa, *gaṇa-devatās*, 157
Marukacchapa, p., 85
Marukucca (v. l. Marukacca Murukucca, Muruku, Bharukaccha, Maruhaturukaca, Nuruka, Marukastha, Purukutsa, Gurukutsa and Paramucca), p., 85
Māruta, wind god, 146
maśaka, 366
māṣaka, weight, 319, 322, 325, 329
masonry, 303-04
Mataṅga, c., 313, 314, 315
Mātariśvan, 158
Maṭha (?), p., 88
Mathurā, l., 104
Mathura inscription of the time of Huvīṣika, 350
Mathura pillar inscription of the time of Chandra Gupta II, a., 187
Matkuṇa, elephant, 295
Mātrkās, mother goddesses, 153-55, 168, 172, 192, 193, 199
Matsya, c., 85
Matsya-purāṇa, t., 53, 77, 94, 107, 108, 120, 174, 195, 200, 335, 381, 382, 384, 385, 393, 394, 396, 403, 412, 413, 414, 415, 416, 418, 422, 424, 474, 484.
Mattamayūra, metre, 458
Mattavilāsa-prahasana, play, 142
Mazumdar, B.C., a., 313, 352
Maya, a., on architecture and Jyotiṣa, 398, 418, 419, 444-45, 454
Mc Crindle, J. W., a., 64, 80, 84, 110, 112, 113, 114, 119, 120, 121, 122, 255, 334, 343, 345, 353
measurements, of capacity, 326; lineal, 327-28
meat; diet, 216
Medhātithi, a., 349
Medinī, lexicon, 486
Megasthenes, a., 61, 71, 87, 272, 318
Meghadūta, t., 3, 57, 59, 100, 136, 137, 169, 184, 257, 261, 288, 496, 499, 503
Meghamālā, t., 496, 503, 505, 506
Meghavān, m., 54
Meharauli iron pillar inscription of Candrar, 11, 69, 302
Mehta, R. N., a., 110, 114, 121, 375
Mekala, m., 54
Mekhalā girdle, 230, 255
Mekhalā (= *Upanayana*), sacrament, 174
men, signs of, 367
menstruation, 222
Mercury, 128, 161, 311, 334, 360, 361, 368, 376, 404, 437, 442, 446, 493
Meru, m., 53, 54
Meru, temple, 399-400, 420
Merutuṅga, a., 18, 400, 469
metal work, 301-02
metres used by VM., 458
Mihira, name ending, 14
Mihira, sun-god, 19, 31, 32, 469, 470, 471, 475
Mihira (VM), 12
Mihirācārya (VM), 17, 23
Mihr, Iranian sun-god, 471
Mihravarāza, Mobadān, Mobad, 471
Mihr yasht, t., 471, 475
military encampment and operations, 481

- milk products, 213
mimāṃsā, 243, 457
 Mīnarāja, *a.*, 438, 462
 ministers, 480
 mirror, 239
 mixed castes, 205-07
 Mirashi, V.V., *a.*, 64, 67, 90, 100, 111, 124, 184, 187, 196, 355, 440
 Misra, G. S. P, *a.*, 332, 345
 Misra, Padma, *a.*, 115
 Mithilā, *l.*, 99, 104
 Mithuna, *rāśi*, 249
 Mithra, Iranian sun god, 14, 471
 Mitra, god, 146, 189
 Mitra, R. L., *a.*, 41, 262, 263
 Mleccha, *p.*, 85, 207, 245, 437, 461
modaka, 214
 Monier Williams, *a.*, 54, 252, 332, 333, 513
 Moon, 161, 166
 Mora stone slab inscription, 135
 morality, 244
 Motichandra, *a.*, 122, 137, 246, 250, 254, 255, 375
 mountains, 51-57
 mouth-perfumes, 234
Mr̥cchakaṭika, *t.*, 247, 258, 415, 503
 Mr̥ga, deity, 391
 Mr̥ga, elephant, 295
 Mr̥gaśīras, *nakṣatra*, 134, 161, 162, 168, 176, 200, 237, 249, 437, 488
Mudrā-rākṣasa, *t.*, 345
Muhūrta-tattva, *t.*, 489
 Muir, J., *a.*, 187
 Mukhacapalā, metre, 458
 mukha-vāsa, mouth-perfume, 234
 Mukherji, B.L., *a.*; 37
 Mukherjee, B.N., *a.* 16, 59, 88, 476
 Mukherjee, D.N., *a.*, 35
 Mukhya, deity, 391
muktā, *pearl*, 313
mukta-sūryā, 372
 Mukuṭa, crown, 226
 Mūla, *nakṣatra*, 146, 161, 176, 177, 190, 249, 331, 359, 489
mūla-dvāra, main door, 384
Mūla-Puliśa-siddhānta, *t.*, 448, 449
 Mūlasthāna (=Multan), 45, 142
 Multan, *l.*, 45
 Muñjadri, *m.*, 54
 Muñjāla, *a.*, 8, 21
mūrdhaja-rāga, hair dye, 236
 music, 411-12
mūṣikā, 426

nāga (=5), 288
 Nāga, *karaṇa*, 163
 Nagas, deified snakes, 163, 166, 172, 304, 404
 Nāgadvīpa, 45
Nagānanda, *t.*, 253
 Nagar inscription of Dhanika, 262
nāgara, 478, 485
Nagara-sarvasva, *t.*, 234, 258
 Nagarjunakonda inscriptions, 71, 75, 492
 Nagna, Jain monks, 178, 199
Nagnajiccitralakṣaṇa *t.*, 454
 Nagnajit, *a.*, 407, 408, 424, 425, 426, 454, 482, 486
 Nagna-śabara, *p.*, 86
Nagnavrata (same as *Nagnajicitra-lakṣaṇa*), *t.*, 454, 482
 Nahapāna, *k.*, 59, 70, 104
 Naidhruva, gotra, 21
 Naidhruva Kāśyapa, *gotra*, 22
 Naik, A. V., *a.*, 264, 487
 Naikritikas, 206
 Naimiṣa, forest, 63
Naiśadhīya-carita, *t.*, 195, 363
nakṣatra-dūṣaka, 358
nakṣatra kūrma, 46
nakṣatramālā, necklace, 228, 257
Nakṣatra-puruṣa, stellar deity, 161, 176, 200

- Nakṣatra-vijaya-snāna*, ceremonial ablution, 173, 200, 242
 Nakula, *a.*, 297, 340
 nālī, measure, 354
 Nālikera-dvīpa, region, 86
 Nandā, 129, 130, 181
 Nandana, year, 490
 Nandana, temple, 399, 400, 421
 Nandivardhana, *do.*, 399, 401, 421
 Nandivarman Pallavamalla, *k.*, 91
 Nandyāvarta, house, 387, 415
 Nandyāvarta symbol, 344
 Nārada, astrologer, 356, 361, 439, 445
Nārada-samhitā, *t.*, 347, 489
Nāradi Samhitā, *t.*, 445
 Naraka, *k.*, 7
narayāna, 308
 Nārāyaṇa, god, 46, 133, 134, 135, 176, 226, 494
 Nārāyaṇa, *a.*, 23, 32
 Nārāyaṇadāsa, *a.*, 2
 Nārīmukha, *p.*, 86
 Narkuṭaka, metre, 458, 459
 Narmadā, *r.*, 48, 49, 59
 Nasik inscriptions, 55, 59, 64, 68, 70, 80, 100, 104, 110, 335, 349, 350, 415
 Nāsikya, *L.*, 104
 Naṣṭarājya, *c.*, or *p.*, 86
nāstika, 177
 Nata, year, 490
 Nath, *A.*, *a.*, 114
Nātyaśāstra, *t.*, 130, 137, 411
 Naukā (also called Horāvivarāṇa and Varāhamihira-horā-tātparya-sāgara), commentary on *BJ*, 21
 Nausamsthāna, lunar appearance, 359
 Navagrāma grant of Mahārāja Hastin, 89
Navanītaka, *t.*, 236
Navasāhasāṅkacarita, *t.*, 487
Nāyādharmakāhā, *t.*, 180
 Nāyāk, *B.V.*, *a.*, 185
nāyaka, office, 481
 Nauge bauer, *O.*, *a.*, 20
nemi, rim, 307
 Nepāla, *c.*, 11, 86
netrapaṭṭa, silk, 223
netr, office, 481
 Nidhanpur plates of Bhāskaravarman, 7
Nigarā, pearls, 320
Nighantū, *t.*, 310
 Nilakaṇṭha, *a.*, 23
 Nilakaṇṭha, commentator, 94, 342
 Nilotpaliyā, commentary on *BJ*, 21
 Nipa, *p.*, 86, 119
Nīrājana, ceremony, 170-71, 177, 199, 225, 477, 480
nirghāta, hurricane, 363, 364, 498
 Nirgrantha (also-thin), Jaina monk, 178
 Nirmand copper-plate inscription of Samudrasena, 141-142
 Nirṛti, deity, 146, 147, 158, 190, 336
Nirukta, *t.*, 62, 77, 334
 Nirvindhya, *r.*, 59
niṣācara, nocturnal animals, 294
Niṣāda, *p.*, 206, 208, 247, 483
Niṣādaka, musical notes, 428
Niṣāda-rāṣṭra, *c.*, 86
Niṣāda-saṅgha, 86
niśāndhatā, night-blindedness, 220
Niṣeka, sacrament, 174
Niṣītha Cūrṇi, commentary, 255
niṣka, coin, 248
Niṣkuṭa, hole, 263
niṣpāva, paddy, 212, 263, 270
niṭāla, 332, 333, 413
Nitivākyāmṛta, *t.*, 483, 484
 Nityaprakāśa Sūri, commentator of *BJ*, 21
niyuddha, 481
 Non-Vedic Sects, 177-79
nṛpamātra, office, 480, 485
nṛpānucara, *do.*, 481
nṛpasevaka, *do.*, 481

- Nṛsimhavana, forest, 63
 Nṛ-varāha, god, 39
 nūpura, anklet, 230
 Nyagrodha-parimaṇḍala, 377

 oblations, 166
 occupations, 304-05
 oceans, 63-64
 odana, 214, 216
 oil-seeds, 270-71
 Ojha, G. H., a., 494
 Omens, a., 166
 Oppert, G., 119, 463, 486
 ornaments, 225-30
 oṣadhi, 200, 278, 292

 pāda, supports of couch or seat, 241
 Pādātāḍitaka, t., 137, 246, 253, 257
 pada-vinyāsa, site-plan, 390-91
 Padma, m., 55
 Padma, moulding of column, 384, 385, 386, 414
 Padma, temple, 399, 400-01
 Padmadhana, god Viṣṇu, 134
 Padmagupta, poet, 482
 Padmaketu, comet, 361
 Padmanābha, astrologer, 32
 Padmanābha, god Viṣṇu, 134, 176
 Padmaprābhṛtaka, t., 137, 250
 Padmārāga, ruby, 313, 322
 padmāsana, seat, 200
 Padmaśrī, a., 258
 Padmodhbhava, god Brahmā, 132
 Padukā, footwear, 224
 Paharpur inscription, 350
 Pahlava, p., 87, 119, 207
 Pahlvi, language, 10
 painting, 412
 Paitāmaha Siddhānta, t., 20, 431, 445-46, 453, 460, 464
 pākhaṇḍa, heterodoxy, 178, 200, 478

 Pakṣaghna, house 387
 pakveṣṭakā, burnt brick, 392
 pala, weight, 325, 354, 370, 388
 measure, 326, 504
 palala, catable, 199, 214, 252
 pālī, embankment, 511, 513
 paṇa, coin, 329, 355
 pañcagavya, 167-68
 Pañcāla, c., 45, 87
 Pañcama, musical note, 428
 Pañcanada, c. 87
 Pañcapakṣī, t., 23
 Pāñcarātra, sect, 135, 136
 Pañca-siddhāntikā, t., also called Kaṛaṇa, 2, 4, 5, 7-10, 20, 24-26, 31; date of, 7-10, 12
 Pāñcatantra, t., 10
 Pāṇḍaraṅgapallī plates of Avidheya, 489
 Pandava, p., 7
 Pandava-Perumal temple inscr. of Kulottuṅga Cola I, 352
 Pande, L.P., a., 37, 187
 Pandey, D. P., a., 156
 Pandey, R. B., a., 200
 Pandit, V. R., a., 21, 43, 196, 197, 335, 374, 418
 Pāṇḍuguḍa, p., 87
 pāṇḍūka, paddy, 212, 270
 pāṇḍuroga, jaundice, 219
 Pāṇḍya, c., 87
 Pāṇḍyavāṭaka, 317, 318
 pāṇigraha, marriage, 209
 Panigrahi, K.C., a., 183, 189, 191
 pāṇimukta, weapons, 482, 486
 Pāṇini, grammarian, 2, 53, 57, 60, 67, 74, 99, 109, 114, 121, 123, 151, 213, 251, 331, 332, 354, 413, 503, 504
 Pañkajaprabhava, god Brahmā, 132
 pantheon (Vedic-pauranic), 127-64
 Pāpa, Mercury's course, 437, 464
 Pāpayakṣmā, deity, 391
 Pārā, r., 59

- Parābhava, year, 490
Pārājika, t., 331, 344
 Paraloka, l., 104, 317, 318
paramānna, 215
paramāṇu, measure, 324, 354
paramāyus, 367
 Parameśvara, god Śiva, 139
 Parāśara, sage, 162, 294
 Parāśara, a., 2, 47, 123, 248, 261, 294, 336, 343, 375, 376, 377, 436, 437, 439, 443, 445, 446-47, 450, 452, 461, 462, 463, 489, 491, 493
 Parāśara-smṛti, t., 248
Pārāśaratantra, t., 47, 50, 446, 464, 495, 496, 498, 504, 505, 506
Pāraśava, c., 88, 317, 318, 319
 Pāraśava, sub-caste, 206, 208, 247, 382
 Pārata, p., 88
 Pargiter, F. E., a., 52, 53, 54, 55, 57, 62, 89, 98, 110, 111, 112, 119, 122
 Paridhāvin, year, 490
pariṅha, 362
parimāṇa, 324
Parīśiṣṭaparvan, t., 124
 Parivatsara, year, 490
pariveśa, halo, 203, 363, 364
 Pāriyātra (v. l. Pāripātra), m., 45, 48, 49, 55, 59, 369
 Parjanya, deity, 391
 Parṇa-śabara, p., 86, 88
Pārśvaśāyin, lunar appearance, 359
 Pārthiva, year, 453
 Pārvatāśrayiṇah, Himalayan people, 47
 Pārvatī, goddess, 139
paryāṅka, 240, 241
Pacāddeśa, 47, 50
 pastimes, 244
Pāśupāla, p., 88
 Pāśupata, sect, 141, 168
Pāśupata Sūtra, t., 187
 Pāṭaliputra, l., 9, 18, 469
 Patañjali, grammarian, 48, 60, 102, 121, 151, 215, 331, 418
paṭavāsa, 236
 Pathyāryā, metre, 458
 Patil, D. R., a., 108, 117
 Paṭola (v. l. Palola), region, 88
patroma, silk, 223-24, 255
paṭṭa, do., 223
paṭṭa, ornamental headbands, 170, 226-27, 256, 477, 479, 485
 Patwardhan, M.T., a., 43
 Pauliśa, astronomer, 438, 447-48
Pauliśa Siddhānta, t., 6, 20, 33, 36, 431-32, 437, 448-49, 451, 460
 Paulus Alexandrinus, a., 448
Paṭima-cariya, t., 228
paura, 479, 484
 Paurava, p., 88-89
 Pauṣa, year, 311, 489
pauṣṭika mantras, 171
pauṣṭika rites, 174
 Pavana, god, 146
pāyasa, eatable, 172, 215
 Payoṣṇī, r., 60
 pearl, sources, 317, 321; provenances, 317-19; prices, 319-20; beliefs, 321-22
 pearl-necklaces, 227-29
 Pei-che, Chinese, a., 95
 perfumery, 232-36
 peoples, 64-100
Periplus of the Erythraean Sea, t., 49, 50, 64, 68, 69, 71, 78, 87, 100, 104, 105, 113, 114, 115, 117, 118, 121, 122, 124, 263, 318
phaladruma, fruit-tree, 278
 Phalagrantha, a branch of Jyotiṣa, 430-31, 434-35
phalataru, fruit-tree, 278
 Phalgulukā, r., 60
 Phālguna, year, 488, 493
phalin, fruit-tree, 278
 Phaṇikāra, p., 89

- Phenagiri, *m.*, 55
phanaka, soap, 239
Piccā, pearls, 320
Pikkā, *do.*, 320
 Pillai, L. D. Swamikannu, *a.*, 10
 Pināka, Śiva's bow, 140
piṇḍa, 175
piṇḍa-dhūpa, incense, 235
Piṇḍikā pedestal, 406, 419, 424
 Piṅgala, year, 490
 Piṅgala, *a.*, 459
Piṅgalachandaḥsūtra, *t.*, 467
 Pingree, David, *a.*, 20, 40, 438
 Piśāca, demi-gods, 150, 159, 169, 195, 361, 404
Piśācālaya, 195
Piśāca-saṅgha, 195
 Piśika, *p.*, 89
piṭaka, ornaments, 181
piṭaka, pimples, 368, 376
 Pitāmaha, god Brahmā, 131, 436
 Pitāmaha, *a.*, 446, 463
 Pitṛ, manes, 159, 160, 175, 390, 391, 491
Pitṛpūjā, 175
Pitṛvana, 159
 plasters, 392
 Plava, year, 490
 Plavaṅga, *do.*, 490
plīhaka, disease, 220
 Pliny, classical *a.*, 71, 91, 109, 262
 polygamy, 209
 polity and government, 477-87
 pond, embankment of, 511
 Poona plates of Prabhāvatī-guptā, 196
 Popley, H.A., *a.*, 411
 pottery, 303
Prabandha-cintāmaṇi, *t.*, 18, 400, 469, 475
Prabandha-koṣa, *t.*, 18, 475
 Prabhāsa, *l.*, 104
 Prabhava, year, 490, 491, 492
Prabhāvaka-carita, *t.*, 400
 Prācyā, Eastern Division of India, 47, 50
pradakṣiṇāgra, 263
pradhāna, caravan leader, 308, 349, 378
 pradeśinī, second toc, 409
 Pradyumna, deified Vṛṣṇi hero, 135, 147, 148, 156
 Prāgjyotisa, *c.*, 89
praharaṇa, 482, 486
 Praharsaṇīya, metre, 458
 Prajāpati, god, 131-33, 137, 171, 183, 491
 Prajāpati, year, 490
Prajñāpanā, *t.*, 79
 Prakāśa, commentary on *BJ*, 21
 Prākṛta, Mercury's course, 431
Pralīnaka, 16-sided column, 385
 Pramādin, year, 490
 Pramathas, 140, 149, 282, 384, 398
 Pramathādhipa, god, 149
 Pramāthin, year, 490, 492
prameha, diabetes, 219
 Pramitākṣarā, metre, 458
 Pramoda, year, 490
prāpta-sūryā, 372
 Prasabha, metre, 458
prāsāda, 394-95
prasādālakṣaṇa, *t.*, 441, 454
prasāda-paṭṭa, 226, 227, 231, 256
prasaha, animals, 295
 Praśastādri, *m.*, 55
Praśaya hasta, measure, 327, 354
Praśna-candrikā, *t.*, 23
Praśna-cūḍāmaṇi, *t.*, 23
Praśna-mahodadhi, *t.*, 23, 41
Praśna-Vaiṣṇava, *t.*, 23
Praśna-viplava (also called *Vaiṣṇavaśāstra*), *t.*, 2
prastha, measure, 326
 Prasthala, *c.*, 89
prāsthānika-maṅgala, 378
pratāna, 270
 Prathama Muni, god Brahmā, 131

- Prathama Muni, *a.*, 436
pratīhāra, 398
pratisara, 169
Pratimālakṣaṇa, *t.*, 454
pratiṣṭhā, installation, 168
pratisūrya, mock sun, 363
pratuda, animals, 295
prātyantika, border chief, 369, 479, 485
pravara, 313
pravara-rāja-puruṣa, office, 380, 481
praurajyā, ascetic life, 247
Prayāga, *l.*, 48, 49, 84, 104
Prayag Dayal, *a.*, 156
Preta, spirits, 404
prices, 310-11
priest, 160-65
priyaṅgu, paddy variety, 270
Prthūdaka, *l.*, 49
Prthuyaśas, VM's son, author of *Saṭpañcāśikā*,
 14, 22, 38; wrongly described as
Bhaṭṭotpala's son, 41
Prthvidhara, deity, 391
Przyluski, *J.*, *a.*, 69
Ptolemy, *a.*, 50, 53, 54, 55, 57, 58, 64, 65, 69,
 71, 73, 78, 80, 81, 82, 87, 88, 89, 91, 92,
 95, 96, 100, 104, 105, 106, 110, 111, 112,
 113, 114, 115, 117, 118, 119, 120, 121,
 122, 124, 314, 318, 438, 449
Pulaha, sage, 162
pulaka, 313
Pulakesin II, *k.*, 5, 35, 71, 83
Pulastya, sage, 162
Pulinda, *p.*, 89
Puliśa, astronomer, 328, 448
Vide Pauliśa above.
Puliśa-siddhānta, *t.*, 448, 464. See *Pauliśa*
Siddhānta above.
punarbhū, remarried woman, 211, 250, 251
Punarvasu, *nakṣatra*, 162, 237, 488
Puṇḍra, *c.*, 89-90, 223, 313, 315
Puṇḍravardhana, *l.*, 48
Puñjadri, *m.*, 54
punnāman, animals, 294
punṣyāha, 129, 168, 171, 173
pūpa, cakes, 215, 252
pura-bhūbhṛt, 483
purāṇa, coin., 329, 330, 355
Purāṇas, 176
Purandara, god Indra, 127
Purandara-bhakta, 128
Purikā, *l.*, 90
purohita, office, 182, 480
pūrta, act, 394
Puruhūta, god Indra, 127
puruṣa, measure, 327, 328
Pūruṣāda, *p.*, 90
Pūrva-Bhadrapadā, *nakṣatra*, 157, 162, 489,
 492
Pūrvadeśa, 47
Pūrva-Phalgunī, *nakṣatra*, 146, 162, 488
Pūrv-Āṣādhā, *nakṣatra*, 161-162, 164, 331,
 359, 489, 497, 498, 503, 504, 508
Pūrvasāgara, Bay of Bengal, 63
pūrvasasya, *Kharif* crop, 268, 331
Pūṣan, god, 146, 391
pūṣan, a person, 17
Puṣkalāvatī, *l.*, 104
Puṣkara, cloud, 502, 503
Puṣkara (also *Puṣkarāraṇya*), forest, 63
Puṣkarāṇyādi-paddhati, *t.*, 24
puṣparāga, 313
puṣpadruma, 278
pustavārta, 305
Puṣya, *nakṣatra*, 162, 200, 237, 321, 514
Puṣya-śānti, rite, 132, 439
Puṣya-snāna, ceremonial ablution, 157, 159,
 161, 171-74, 175, 242, 258, 278, 280,
 282, 441, 477, 479, 480. Also called
Puṣya-śānti, 136
Puṣyavarman, *k.*, 7
Ṁṛta, metre, 458
puṭabhedaka (also *puṭabhid*), stone, 303, 345

- Pūtanā, demoness, 160, 389
putavāsa, talcum powder, 235-36, 260
putrakāmya, an *iṣṭi*, 165
 Puvvāyariya, *a.*, 366

rāgayukti, 225, 346
 Raghunātha Manohara, *a.*, 22
Raghuvamśa, *t.*, 3, 50, 51, 54, 55, 59, 79, 89, 97, 98, 121, 137, 179, 185, 199, 209, 227, 257, 263, 264, 283, 288, 292, 318, 333, 343, 350, 352, 377, 378, 421
 Ragozin, *a.*, 113
 Rāhu, 132, 158, 160, 202, 336, 358, 359, 360, 375, 404, 423, 430, 436, 498
 Rai, Gulshan, *a.*, 5
 rainfall, 495-508
 Raivataka, *m.*, 50, 55
 Rāja (perhaps an error for Rāta), *a.*, 459, 467
rāja-bhṛta, office, 481
rāja-dhānya, 270
rājādhikṛta, office, 481
rājamāṇi, precious stone, 313, 323
Rājamārtanḍa-saṅgrah, *t.*, 30
Rājamrgāṅka, *t.*, 8
 Rājanya, *p.*, 90
rāja-puruṣa, office, 380, 413, 481
rajas, measure, 327, 328, 354
 Rājaśekhara, *a.*, 45, 47, 48, 49, 50
Rājataranṅiṇi, *t.*, 7, 35, 74, 113, 116, 117, 122, 199, 262, 265, 353, 496, 502
 Rājayaśmā, deity, 391
rajopasevin, office, 481
rajju, 390, 417
 Rajwade, V.K., *a.*, 475
rakṣādhikṛta, office, 481
 Rākṣasa, year, 490
 Rakṣas, demi-gods, 159, 190, 404
 Rākṣasa, demons, 150, 195
 Rākṣasi, demoness, 160, 389
 Raktaksa, year, 490
raktaśāli, rice, 212, 270, 362
 Rāma, 22
 Rāma, son of Daśaratha, 136, 137, 405, 424
 Rāmachandran, T. N., *a.*, 111
 Ramaṭha, *p.*, 90
 Rāmavarman, 30
Rāmāyaṇa, epic, 11, 51, 63, 66, 69, 73, 76, 77, 80, 88, 120, 176, 242, 249, 335
 Rao, B. Suryanarayana, *a.*, 6, 19, 469, 137
 Rao, N. Jagannatha, *a.*, 5
 Rao, S.R., *a.*, 185
 Rao, T. A. Gopinatha, *a.*, 138, 183, 192, 226, 264, 423, 425, 426, 427
 Rapson, E. J., *a.*, 64, 81, 113, 196, 355
raśanā, girdle, 230
raśanā-kalāpa, elaborate girdle, 230
raśmikalāpa, necklace, 228, 256
Raśmiketū, comet, 361
 Raśmisamsarga, planetary conflict, 447, 464
 Rāta, *a.*, 459. *Vide* Rāja above
 Rathākhyā, *v.l.* Rathasvā, Rathampā, Rathasyā, Rathaspā, Rathāhvā), *r.*, 60
rati-bhavana, 380, 381
ratna, 313
 Ratnadeva, Kalanuri, *k.*, 32
Ratnadīpikā, *t.*, 312
 Ratnākara, *a.*, 411
 Ratnapāla, *k.*, 89
ratna-parīkṣā, *t.*, science, 355
Ratnaparīkṣā, *t.*, 312, 313, 315, 316, 319, 350, 355
Ratnaśāstra, *t.*, 312, 351
Raudra, comet, 361
 Raudra, year, 490, 491
Ravaka, pearls, 320
 Rawlinson, H.G., *a.*, 287
 Ray, J.C., *a.*, 333
Rāyapaseṇiya-sutta, *t.*, 180
 Raychaudhuri, H. C., *a.*, 35, 46, 47, 52, 54, 107, 109, 111, 115, 121, 136, 185

- Raychaudhuri, S. P., *a.*, 500, 506
 regional products, 309-10
 religion, 126-200
 religious practices, 165-78
 reptiles, 299
 Revā (=Narmadā), *r.*, 57, 59
 Revanta, god, 152-53
 Revatī, *nakṣatra*, 146, 162, 168, 200, 237, 249, 489
Rgveda, *t.*, 60, 62, 70, 71, 82, 92, 127, 130, 131, 136, 151, 162, 163, 164, 169, 179, 203, 204, 254, 334, 473, 496
 Rhys Davids, T. W., *a.*, 68, 105, 114, 124, 336, 375, 412
 Rice, L., *a.*, 110
 Rikta, wagtail, 298
 Risle, H., *a.*, 38
 Riṣyamūka, *m.*, 55
 rivers, 57-62
 Rjvi, Mercury's course, 440
 Rkṣa, *m.*, 45, 56-57
Rkṭantra Prātiśākhya, *t.*, 60
 Robertson, F. C. Ford, *a.*, 282
 Rodhakṛt, year, 489
 Roga, deity, 390, 391, 417
 Rohiṇī, *nakṣatra*, 24, 131, 161, 168, 170, 204, 249, 311, 331, 437, 439, 441, 443, 447, 461, 488, 498, 499, 500, 503, 514
 Rohita, fish, 299
 Romaka, *p.*, 90
Romakasiddhānta, *t.*, 6, 9, 20, 33, 36, 431-32, 437, 438, 449, 450, 451, 453, 460
 Rowland, B., *a.*, 343
 Rṣabha, *p.*, 90
 Rṣabha, musical note, 411, 427, 428
 Rṣabha, *a.*, 439, 440, 443, 450, 457
 Rṣika, *p.*, 67, 90
 Rṣiputra, *a.*, 440, 450, 465, 489, 496
Rtu-samhāra, *t.*, 261
 ruby, 322; kinds, 322; prices, 322-23
 Rucaka, great man, 204, 368, 369, 370, 371, 377
Rucaka, rectangular column, 385
 Rucaka, house, 387
 Rucira, metre, 458
 rudhirākhyā, carclian, 313, 351
rudhira-vilāpana-pāyasa, 252
 Rudhironḍgārin, year, 494
 Rudra, god, 132, 139, 140, 150, 391
Rudra (=11), 157
 Rudradāman I, *k.*, 65, 66, 68, 80, 86, 100, 110, 119, 271
 Rudras, *gaṇadevatās*, 157, 172, 194
 Rudrasimha I, *k.*, 64
 Rudraṭa, *a.*, 28
rūbaka, coin, 157, 316, 319, 320, 322, 329-31
Rūpasattra, vow, 135, 162, 176
 Śabara, *p.*, 90-91
 Śabaravāmin, 17, 39
Śabdakalpādruma, lexicon, 257, 265
 Sachau, E., *a.*, 32
 Śacī, goddess, 156, 209
 Sācin, attendant of Śaśa, 258, 370, 371
saciva, office, 380, 480, 485
 sacrifices, 164-67
Sādhāraṇa hasta, 327, 354
 Sādhāraṇa, year, 490
 Sādhyas, *gaṇadevatās*, 157
 Ṣaḍja, musical note, 411, 427, 428
Sadratnamālā, *t.*, 30
 sages, 162-63
 Sāhasāṅka, *k.*, 4
 Sahasracakṣus (also Saharākṣa), god Indra, 127
 Sāhasāṅka, Vikrama era, 4
 Sahyagiri, *m.*, 46, 55, 70
 Śailasutā, goddess, 156
 Śaivism, 172
 Śaka, *p.*, 91, 119, 207
Śaka-bhūpa-kāla, 5, 494
 Śākavipī Brāhmaṇas, 14, 473
Śaka-kāla, 5

- sakalāvaninātha*, 478
Śakendra-kāla, 5, 464, 494
Sāketa, *l.*, 51, 104-105
śākhā, door-jamb, 383, 397, 419
Śākhā, a branch of Jyotiṣa, 430-31, 460
Śakra, god, 127, 128, 391
Śakra, *a.*, 15, 450, 465
Śakrāgnī, gods, 179
Śakrānala, *do.*, 179, 491
Śakra-janitrī, 130, 181
Śakra-kumārīs, 129, 181, 182, 443
sakṣīra, milky plants, 278
Śakti, Parāśara's ancestor, 447, 464
saktu, groats, 215
śākunas, omens, 15, 137, 356, 358, 372-74, 439, 440, 441, 442, 443, 447, 450
Śākyā, Buddhist monk, 168, 178, 199
Śākya-bhikṣu, *do.*, 178
Śākya-kāla, 6
śālā, 382, 383
Sālavatī, *r.*, 48
śālākya, eye-specialist, 217
Saletore, R. N., *a.*, 350
śālī, paddy, 212, 214, 269, 270
Śālihotra, *a.*, 296
salilacara (also *salilaja*), aquatic animals, 294
saliladurga, water-fort, 481
Śālinī, metre, 458
Śālivāhana-Śaka (also Saka) era, 4, 6
Sālva, *c.*, 91
Śama hasta, measure, 327, 354
Sama, lunar appearance, 359
Sāmanta, 380
Samarāṅgaṇasūtradhāra, *t.*, 390, 393, 399, 404, 415, 416
Sanmaivijaj odaya, *t.*, 41
Samāsa-saṁhitā, *t.*, also called *Svalpa-saṁhitā*, 21, 49, 109, 163, 354, 461, 493, 504, 507
samasta-rājyārthin, 242, 264, 479
Samataṭa, *c.*, 11, 91-92
Samavāyāṅgasūtra, *t.*, 357
Sāmaveda, *t.*, 169, 204
Śāmba, deified Vṛṣṇi hero, 135, 142, 147, 148-49, 156, 470
Śāmbapura, old name of Multan, 45, 188
Śāmbapurāṇa, *t.*, 142, 424
Śambhu, god, 139, 140, 199
Samhitā—*BS*, 25, 26, 108
Samhitā, a branch of Jyotiṣa, 19, 30-31; contents of, 434-35; contents of older Samhitās, 436-37, 459, 460
śamīdhānya, 270, 332
śamī-jāti, 219
Samīraṇa, wind god, 146
Sampūrṇa, wagtail, 298
Samskāra-candrikā, *t.*, 180
samskāras, 174-75
Samudga, temple, 399, 400
Sāmudra, *t.*, 377, 457
Samudradaṇḍaka, metre, 458
Samudra Gupta, Gupta *k.*, 11, 48, 49, 63, 64, 66, 67, 78, 79, 84, 91, 100, 119, 164, 182, 184, 196
Sāmudravid, , 367
saṁvarta, cloud, 502
Samvarta, comet, 361
Samvartaka, sage, 162
Samvarta-smṛti, *t.*, 248
Samvatsara, year, 490
sāmvatsara (also *sāmvatsarapāthin*, *sāmvatsarika*, *daivacintaka*, *daivavid*), astrologer, importance of, 356; qualifications of, 358; office, 480
Sanaka, sage, 162
Sanandana, *do.*, 167
Sanātana, *do.*, 162
Sanatkumāra, *do.*, 162
Sanchi inscriptions, 101, 106
Ṣaṇḍha, elephant, 295
sandhyā, 162, 362-63
saṅgha, 477, 483

- Saṅghavarman, *a.*, 76
 Sanjana, J.E., *a.*, 471, 475, 476
 Śaṅkara, god, 129, 158
 Saṅkaranarayanan, S., *a.*, 114
 Śaṅkaravarman, *a.*, 30
 Saṅkāśya, *l.*, 13, 35
 śaṅkha, 313, 323
 Sankisa, *l.*, 13
 Śaṅkha, temple, 425
 Sāṅkhāyana-śrautasūtra, *t.*, 418
 Sāṅkhya-kārikā, *t.*, 457
 Sāṅkhya-sūtra, *t.*, 457
 Saṅkhyāta, *p.*, 92
 Saṅkīrṇa, elephant, 295
 saṅkrāmaṇa-viropaṇa, transplantation, 307-08
 Saṅkṣipta, Mercury's course, 437, 464
 Saṅkṣobha, *k.*, 63
 Śaṅku, 17, 32, 39
 śaṅku, measure, 315
 śānta, 372, 373
 śānti, expiatory rites, 170, 194, 204, 246, 258, 364
 śāntida, pose 11, 138, 441, 442, 478
 Śāntika, *p.*, 92
 Sanyal, N.B., *a.*, 192
 Śapharī, fish, 299
 Saptarṣis, *a.*, 15, 450, 461
 Saptarṣis, seven sages, 162, 362
 Sāra, an *alaṅkāra*, 28
 śārada, crop., 332
 Śaradhāna, *p.*, 92
 sāra-dhānya, 269
 Sārasvata, *a.*, 444, 450
 Sārasvata, *p.*, 60
 Sarasvatī, *r.*, 49, 60-61, 113
 Sarasvatī, goddess, 157, 194
 Saraswati, S. K., *a.*, 343, 402
 Sārāvalī, *t.*, date of, 31
 Śārāvātī, *r.*, 48
 Sarayū, *r.*, 61
 Śārdūlavikrīḍita, metre, 458
 sarīṣṭpa, reptiles, 295
 Sarkha plates of Kalacuri Ratnadeva, 32
 Sarma, K.M., *a.*, 4
 Sarma, K. V., *a.*, 20, 35
 Sarnath inscription of Prakāṣāditya, 136
 Śārngadhara-paddhati, *t.*, 234
 sārtha, caravan, 205, 308, 349
 sārthavāha, caravan leader, 308
 sārvaḥauma, 478
 Sarvadarśanasanṅraha, *t.*, 187
 Sarvadhārin, year, 490
 Sarvajita, *do.*, 490
 Sarvarī, *do.*, 490
 sarvatobhadra, perfumes, 233-34
 Sarvatobhadra, house, 387, 415
 Sarvatobhadra, temple, 399, 401-02, 422
 Śaśa, great man, 368, 369, 370, 371, 377
 Sāsanavaṁsa, *t.*, 71
 śaśikānta, precious, stone, 313, 323
 śaṣkulikā, 215, 221
 ṣaṣṭika, rice, 212, 214, 221, 270
 śāstra, 486
 śāstrapāna, 483, 487
 Sastri, Hirananda, *a.*, 187
 Sastri, H. P., *a.*, 30, 42
 Sastri, K.A.N., *a.*, 115, 351, 353
 Sastri, Sambasiva, *a.*, 42
 Sastri, S. N. Majumdar, *a.*, 65, 107, 110, 122, 345
 Sastri, V. S. *a.*, 108, 111, 112, 113, 149, 198
 Sastry, T. S. Kuppanna, *a.*, 20, 35
 sasyaka, precious stone, 313, 323, 353
 Śatabhiṣaj, *nakṣatra*, 131, 162, 237, 489, 498, 514
 Śatadrū, *r.*, 61
 Śatāmanyu, god Indra, 128
 Śatānanda, *a.*, 2, 31, 32
 Śatapatha-brāhmaṇa, *t.*, 136, 137, 157, 162, 163, 247
 Śatpañcāśikā, *t.*, 14, 22, 38, 41
 Śatpañcaśatī, *t.*, 41

- Saturn, 161, 249, 311, 334, 336, 360, 361, 368, 404
- Satya, *a.*, 3, 455, 466
- Satya, deity, 391
- Satyadatta, *k.*, 17
- Satyavati, 19, 469
- saubhāñjana*, 239
- saugandhika*, ruby, 313, 322
- Śaulika, *p.*, 94
- Saumya, territory, 45
- Saumya, year, 490
- Saundarananda*, *t.*, 48
- Saura cult, 472
- Saura Siddhānta* (also called *Sāvitra Siddhānta*), *t.*, 431-32, 451-52, 460
- Saurikīrṇa, *p.*, 92
- Sauvīra (ka), *c.*, 61, 93
- Sāvaṣṭambha, house, 383
- Savitṛ, god, 199, 391
- Sāvitra, *do.*, 391
- Sāvitra-śāstra*, *t.*, 198, 457
- Sāvitra Siddhānta* (same as *Saura Siddhānta*), *t.*, 431-32
- Sāyaṇa, Vedic commentator, 163, 496
- śayanāsana*, furniture, 239
- Sāyāśraya, house, 383
- śayyāsana*, furniture, 239
- Schoff, W. H., *a.*, 64, 68, 71, 100, 109, 124
- sculpture, 403-10
- senādhipa*, office, 480, 485
- senānī*, *do.*, 480, 485
- senāpati*, *do.*, 231, 256, 380, 413, 480, 481, 485
- Sen, P. C., *a.*, 120
- Sengupta, P. C., *a.*, 35, 452, 460, 465
- Setakaṇṇika, *l.*, 48
- Sevaka, Brāhmaṇas, 473
- Sewell, R., *a.*, 493, 494
- Shah, T. L., *a.*, 4, 33, 40
- Shah, U. P., *a.*, 4, 33, 476
- Shamasastri, R. *a.*, 352
- Sharkot inscription, 92
- Shastri, Ajay Mitra, *a.*, 18, 35, 37, 39, 43, 97, 99, 101, 111, 124, 138, 185, 483
- Shastri, J. L., *a.*, 21, 296, 197
- Shukla D. N., *a.*, 192, 194, 416
- Shukla, K. S., *a.*, 20
- Shaving, 236-37
- Śibi, *p.*, 92-93
- Śibiragiri, *m.*, 55
- Siddhas, demi-gods, 132, 157, 159, 172, 404
- Siddhāntas, 20, 431-32
- Siddhānta-śiromaṇi*, *t.*, 8, 9, 36, 451
- Siddhārtha, house, 388
- Siddhārtha, year, 490, 492
- Siddhasena, astrologer, 3, 441, 452, 455, 466, 496
- Siddhi, goddess, 157
- śighraga*, animals, 295
- śikhara*, 400
- Śikharīṇi, metre, 458
- Śikhin, god, 390, 391
- Siktha*, pearls, 320
- śikya(ka)*, 324
- silhaka*, incest, 310
- Simha, *rāśi*, 334
- Simha, temple, 399, 402, 422
- Simhācārya, astronomer, 3
- Simhala, *c.*, 45, 46, 93, 317, 318
- Simhapura, *l.*, 105
- Simhikā, Rūhu's mother, 359, 375
- Sindhu, *r.*, 61
- Sindhu, *c.*, 93, 369
- Sindhu-Sauvīra(ka), *c.*, 45, 50, 93
- Sinivāli, 162
- Śiprā, *r.*, 61
- śirā*, 390, 417
- śiras*, 241
- Sircar, D. C., *a.*, 18, 72, 83, 111, 116, 117, 118, 120, 123, 180, 350, 355, 440, 484, 485, 493
- Sirindhra, *l.*, 105

- Siripuram plates of Anantavarman, 494
śiromaṇi, head-jewel, 226
 Sita, *p.*, 116
 Sita-Hūṇa, *p.*, 75, 361
 Śitaka, *p.*, 93
 Śiva, god, 12, 128, 130, 132, 134, 138, 139-42, 153, 156, 183, 186, 230, 404, 457, 491
 Sivaramamurti, C., *a.*, 257, 264, 265, 487
Si-yu-ki, *t.*, 13
 Skanda, god, 150-52, 160, 172, 178, 191, 193
 Skanda Gupta, *k.*, 49, 55, 75, 136, 371, 476
 Skandahaka, metre, 458
skandhāvāra-niveśa, 481, 486
 slavery, 306
 Śloka, metre, 458, 459, 468
smaroddipana, perfume, 233
 Śmaśrudhara, *p.*, 93
 Smith, V.A., *a.*, 345
Smṛti-candrikā, *t.*, 346
 Śobhakṛt, year, 494
 social structure, 202-07
 society, 201-66
 Śoḍaśāśri, temple, 399, 402
 Soḍḍhala, *a.*, 81
 Śokahr̥t, year, 490, 494
 Soma, god, 144, 146, 158, 194, 248, 391, 445, 449, 463, 491
 Someśvara, *a.*, 295
 Śoṇa, *r.*, 61
 Sorensen, *a.*, 114
śoṣa, pthisis, 219
 Śoṣa, deity, 391
 Sosṇiṣa, house, 383
 Sphujidhvaja, *a.*, 438
 spices, 212
śrāddha, 175
 Śragdharā, metre, 458
 Sravaṇa, Buddhist monk, 178
 Śravaṇā, *nakṣatra*, 134, 162, 168, 181, 200, 237, 321, 437, 461, 489
 Śravaṇa, year, 489
śreṇi, guild, 308, 349
śreṇiśreṣṭha, guild president, 308
śreṣṭhin, trader, 308
 Śrī, goddess, 157
 Śrīdhara, god Viṣṇu, 133, 176
 Śrīdhara, commentator, 23
 Śriharśa, *a.*, 363
 Śrīmukha, year, 490
 Śrīnanda, *k.*, 18
 Śrīnivāsācārya, *a.*, 2
 Śrīnivāsamiśrātmaja, *a.*, 2
 Śrīparvata, *m.*, 56
 Śrīpati, *a.*, 21
 Śriṣeṇa, astronomer, 449, 453, 465
 Srī-Vaiṣṇavism, 14
Srīvatsa, emblem, 138, 179, 185, 200
śrīga, 400
Śrīṅgara-taraṅgiṇī, *t.*, 22
Śrīṅgara-hāṭa, *t.*, 253
śrīṅgin, horned animals, 295
srotoṅjana, 239, 262
śrotriya, 167, 204, 246
 Srughna, *l.*, 105
 Śrutasena, *a.*, 3
 Stein, M.A., *a.*, 65, 72, 96, 105, 113, 116, 117, 122
 Stāṇviśvara *l.*, 49
sthapati, architect, 168, 305, 381, 393-94, 413, 417
 Sthira, metre, 458
 Strabo, Classical *a.*, 71, 73, 109
 Strenzler, *a.*, 458
 Strīrājya, *c.*, 93
strīsaṃjñā, trees, 278; animals, 294
 Śubhahr̥t, year 490
 Śubhakṛt, *do.*, 490, 494
 Subhānu, *do.*, 490
 Subodhinī, comm. on *BJ*, 21
 Sudaśanācārya, commentator of *Āpastamba-grhyasūtra*, 209
 Sudhātṛ, year, 490

- Śuddhidīpikā, *t.*, 2. Also called *Dīpikā*, 32
 Śūdra, *p.*, 93-94
 Śūdra, *varṇa*, 165, 197, 202, 203, 205, 206, 247, 248, 315, 381, 382, 389, 403, 413
 Śūdraka, playwright, 137, 138, 258, 503
 Sugrīva, deity, 391
 Suhma, *c.*, 94
 śūkadhānya, awned grains, 269
 sūkaraka, rice, 212, 270
 Sūkaranayana, hole, 263
 Sukhabodhinī, commentary, 18
 Śukla, year, 490
 Śukra, *a.*, 15, 450, 452, 465
 Śukranītisāra, *t.*, 250, 261, 273, 276, 277, 278, 317, 351, 353, 383, 404, 423, 424, 483
 Sukṣetra, house, 387
 Sūkṣma-jātaka, (=LJ) *t.*, 21
 śukti, 323
 Śuktimat, *m.*, 45
 sukumāraka, 407
 śulāgra, sword, 482
 Śulba, *t.*, 165
 Śūlika, *p.*, 94, 121
 Sun cult, 12
 Sunaḥśepha, sage, 16, 162
 Sung yun, Chinese pilgrim, 95
 sūpa, soup, 215-16
 Suprabhedāgama, *t.*, 192
 Suprakāśa, *t.*, 2
 Supuṣpitāgrā, metre, 458
 surabhavana, shrine, 394
 surālaya, *do.*, 394
 Surasā, demoness, 157
 Ś(S)ūrasena, *p.*, 94, 370
 Surāṣṭra, *c.*, 94, 313, 314, 315, 317, 318
 surayātra, procession of idol, 170, 199
 Śurejya, god, 489
 Śūrpādri, *m.*, 56
 Śūrpakarṇa, *p.*, 94
 Śūrpāraka, *L.*, 79, 105, 313, 314, 315
 Sūrya, god, 11, 12, 13, 23, 37, 134, 142-44, 146, 149, 152, 168, 171, 189, 198, 199, 226, 281, 329, 391, 404, 470
 Sūryadāsa (also called Sūryasūri), *a.*, 22
 Sūryadeva Somasut, *a.*, 21
 Sūryaprajñapti, *t.*, 18
 Sūrya-siddhānta, *t.*, 8, 9, 31, 438, 445, 449, 451-52, 463, 465, 489, 492
 Suśruta, *a.*, 221, 237, 270
 Suśruta-saṁhitā, *t.*, 12, 213, 214, 218, 221, 238, 251, 252, 253, 254, 261, 278, 332, 513
 Susthita, house, 383
 Sūtikādhyāya, *t.*, 24
 sūtradhāra, carpenter, 303
 Suttanipāta, *t.*, 102
 Suttee, custom, 211
 Suvadana, metre, 458
 Suvarṇabhū, region, 45, 94-95
 Suvīra, *c.*, 95
 Suvṛttā, metre, 458
 Svāgatā, *do.*, 458
 Svāhā, goddess, 157
 Svalpa-jātaka (=LJ), *t.*, 21, 22
 Svalpa-saṁhitā (also called Samāsa-saṁhitā), *t.*, 21
 Svalpayātrā (also called Tīkanīkayātrā), *t.*, 20, 21
 Śvamukha, *p.*, 51, 95
 Śvapaca, sub-caste, 206, 208, 247, 389
 svaras, 411
 śvāsa, dyspnoea, 219
 Śvasana, god, 146
 svastika, symbol, 264, 282, 367, 368, 488
 Svastika, house, 387, 415
 Svāti, *nakṣatra*, 146, 162, 168, 237, 249, 452, 489, 498, 499
 Svayambhū, god, 131, 183, 442
 Svayambhū, *a.*, 446
 Svāyambhuva Manu, *k.*, 46
 śvayathu, edema, 218-19
 Śveta, *p.*, 95, 116

- Śveta-Hūṇa, *p.*, 75. See Sita-Hūṇa above
 Śvetaketu, comet, 361
 śvetikā, cowrie, 355
 śvitra, white leprosy, 219
 sweets, 213-14
 swords, 293, 482-83
 Śyāmāka, *p.*, 95
 Śyāmilaka, *a.*, 137

 Taḍāga-paddhati, *t.*, 24
 Tagore, S. M., *a.*, 323, 353
 Taitila, *karaṇa*, 146
 Taittirīya-āranya, *t.*, 137
 Taittirīya-brāhmaṇa, *t.*, 163, 247
 Taittirīya Samhitā, *t.*, 157, 158, 247
 Takṣakā, Nāga, 163, 321
 Takṣasilā, *l.*, 105
 Tāla, *p.*, 95
 talcum powder, 235-36
 Tālikāṭa, *l.*, 105
 Tāmasakīlaka, comets, 358
 tāmbūla, betel, 12, 238
 Tāmralipti, *l.*, 105
 Tāmraparṇa, territory, 45
 Tāmraparṇī, *r.*, 61-62, 317, 318
 taṇḍula, weight, 315, 316, 324, 346
 Taṅgaṇa, *p.*, 95
 T'ang - Chou, Chinese *a.*, 95
 Tantra, mathematical astronomy, 4, 19, 430, 431
 Tantra =PS, 43
 Tāpasāśrama, *l.*, 105
 Tāpī, *r.*, 62
 Tārakṣiti, *p.* or *l.*, 95
 Tāraṇa, year, 490
 Tarn, W. W. *a.*, 113
 Taskara, *c.* or *p.*, 95
 Taylor, W., *a.*, 41
 temples, 394; site, 395; site-plan, 395; measurements, 396; decorative features, 398; types, 399

 Tewari, S.P., *a.*, 138
 textiles, 223-24
 Thāṇāṅga-sūtra, *t.*, 357
 Thibaut, G., *a.*, 8, 9, 20, 36, 431, 462, 464, 465, 466
 Thiruvengkatachar, V., *a.*, 5, 34
 Thina, *l.*, 48
 Tiksṇa, Mercury's course, 437, 464
 tilaka, 239, 262, 366
 tilaudana, 214
 Timi, fish, 299
 Timiṅgilāśana, *p.*, 95-96
 Tilottamā, celestial courtesan, 139
 Tippera copper-plate inscription of Lokanātha, 206
 tīrtha, 377
 tīrthayatrā, 175
 Tiruvorriur-Adhipurisvara Temple inscription of Kulottuṅga I, 351-52
 Tiṣya, *nakṣatra*, 168, 488
 toilet, 236-39
 tooth-sticks, 237-38
 Toṭaka, metre, 458
 trade, internal, 307; caravan, 308; overseas, 311-12
 transportation, means of, 307-08
 trayī, 243, 456, 466
 Trigarta, *c.*, 96
 trimadhura, 169, 214
 Trinayana, god, Śiva, 139
 Trinetra, *do.*, 139
 Trinetra, *p.*, 51, 96
 Tripura, *l.*, 105
 Tripurī, *do.*, 71, 105
 triśālaka, houses, 387
 Trita, sage, 162, 163
 Trivedi, H. V., *a.*, 123
 Trivikrama, god Viṣṇu, 136, 176
 tṛṇa, 278, 284, 286
 tṛṇabhuj, animals, 294
 tsara, 482

- Tulā, *rāśi*, 249
tulā, weight, 325
tulā, weighing balance, 324
tulā māna, 324
Tulapatulā, cross-beams, 385, 414
 Tumain inscription of Kumāra Gupta I, 106
 Tumbavana, *l.*, 106, 124
turaga-bhiṣaj, horse-physician, 217
 Turagānana, *p.*, 51, 68, 96
turaga-rakṣa, office, 481
 Turuṣka, *c.*, 310
turuṣka, incense, 310
tuṣa-dhānya, husk-corn, 268
 Tusham rock inscription, 136
 Tuṣāra(ka), *p.*, 96, 249
 Tvaṣṭṛ, god, 146, 189, 491
 Tvaṣṭṛ, planet, 358

Ubhayābhisārikā, *t.*, 250
ubhayacārīn, animals, 294
udakārgala, 509
 Udayadharādhara, mythical mountain, 478
 Udayagiri, *m.*, 56
 Udayana, Śābora, *k.*, 91
Udayasundarīkathā, *t.*, 81
 Udayavarman, *k.* 30
 Uddehika, *p.* 96
 Udgatā, metre, 458
 Udīcyā, Northern division, 47
udīcyaveṣa, 143, 224
 Uḍra, *c.*, 96-97
 Udumbara, *c.*, 97
udumbara, 129, 166, 171, 383, 397, 413
udvahana, moulding of column, 386
Udvamśa ornament, 230
 Ugra, sub-caste, 206, 208, 245, 247
ugra-daṇḍa, 478
 Ujjan, 7, 9, 13, 15, 17
 Ujjayinī, *l.*, 4, 8, 13, 16, 106, 137, 169, 191, 370, 440, 441, 462
 Ujjihāna, *l.*, 106

ulkā, meteor, 363, 364
 Ullekhana, planetary conflict, 447
ullopikā, eatable, 199, 215
 umbrellas, 231-32
 Upadhyaya, B. S., *a.*, 255
 Upadhye, A.N., *a.*, 16, 470
 Upagiri, *m.*, 53
 Upagīti, metre, 458
 Upajāti, *do.*, 458
 Upajyotiṣa, *p.* or *c.*, 97
 Upanandā, 129, 130, 181
upānāhi, footwear, 224
upāṅga, a branch of Samhitā, 435, 461
uparidamṣṭrīn, animals, 295
Upasargahara-stotra, *t.*, 18
upatūlā, cross-beams, 385, 414
Upavana-vinoda, *t.*, 335, 336
 Upavaṅga, *c.*, 97
upayācitaka, 175
 Upendra, god, 130
 Upendravajrā, metre, 458
 Ūrdhvakaṇṭha, *p.*, 97
 Ūrmimālā, metre, 458
 Ūrva, sage, 162
 Ūśanas, *a.*, 452, 466, 483, 487
 Uśīnara, *p.*, 97
 Uśīradvaja, *m.*, 48
 Uṣṇavakra, course of Mars, 437
uṣṇīṣa, turban, 224, 256
 utensils, 242-43
 Utkala, *c.*, 97-98
 Utpala, *a.*, gloss on *BJ* and *LJ* by, 25, 27; on *YY*, 21; on *BS*, 21, *Vide* also 6, 8, 12, 13, 14, 20, 21, 22, 24-25, 29, 40, 45, 47, 52, 57, 60, 61, 71, 77, 81, 84, 85, 86, 87, 88, 92, 93, 95, 100, 104, 106, 107, 109, 112, 113, 116, 118, 128, 135, 138, 139, 140, 141, 145, 147, 148, 149, 151, 154, 159, 160, 162, 163, 165, 170, 172, 178, 181, 183, 184, 185, 187, 188, 190, 192, 193, 195, 196, 197, 198, 199, 200, 206, 209,

- 212, 214, 215, 219, 220, 223, 232, 234, 235, 236, 237, 238, 244, 246, 247, 250, 251, 252, 253, 254, 258, 259, 260, 261, 262, 266, 269, 270, 275, 277, 278, 279, 280, 281, 282, 283, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 296, 302, 307, 310, 316, 320, 322, 323, 324, 327, 328, 329, 330, 332, 334, 335, 336, 337, 338, 341, 342, 343, 345, 346, 347, 348, 349, 351, 352, 353, 354, 360, 375, 376, 377, 378, 382, 390, 391, 392, 394, 395, 400, 401, 403, 405, 412, 413, 414, 415, 416, 417, 418, 419, 420, 424, 425, 426, 427, 430, 433, 435, 436, 437, 439, 440, 441, 442, 443, 450, 452, 454, 455, 457, 458, 459, 460, 461, 481, 483, 484, etc
Vide Bhaṭṭotpala above
- Utpala-parimala, abridged version of Utpala's commentary on *BS* by Bhāskara, 22
- utpātas*, portents, 356, 359, 364-66, 376, 441, 450
- uttamśaka*, head-chaplet or ear-ornament, 226, 255
- Uttara-Bhadrapadā, *nakṣatra*, 162, 168, 170, 249, 331, 489, 498, 514
- Uttarādhyayana-sūtra*, *t.*, 357, 372
- Uttara-Kuru, *p.*, 81-82
- Uttara-Madra, *p.*, 82
- Uttara-Pāṇḍya, *c.*, 87, 98
- Uttarāpatha, territory, 47, 49
- Uttara-Phalgunī, *nakṣatra*, 146, 157, 162, 168, 170, 249, 331, 488, 514
- Uttarārāmacarita*, *t.*, 62
- Uttar-Āṣādhā, *nakṣatra*, 157, 162, 168, 170, 181, 249, 331, 437, 489, 498, 514
- Uttariya*, upper garment, 224
- Uttaroṭha*, moulding of column, 384-385, 386, 414
- Vaḍavāmukha, *L.*, 106
- Vāgbhaṭa, *a.*, 12, 261
- Vāgīśa, *a.*, 15, 439, 465
- Vahana*, moulding of column, 384-85, 386, 414
- Vāhlika, *c.*, 69. See Bāhlika above.
- Vaidhṛti, *karaṇa*, 249
- vaidūrya*, 313, 323,
- Vaidya, C. V., *a.*, 34
- Vaidya, P. L., *a.*, 232
- Vaijaryantī*, lescion, 349
- Vaikhānasāgama*, *t.*, 405
- Vaikhānasa-gr̥hyasūtra*, *t.*, 204
- Vainateya, *a.*, 15
- Vaiśākha, year, 489
- Vaiśālī seals, 480
- Vaiśeṣika system, 457
- Vaiṣṇava*, sectarian title, 135
- Vaiṣṇava-śāstra* (also called *Praśna-viplava*), *t.*, 2
- Vaiśravaṇa, god, 145
- Vaiśvadeva, 164
- Vaiśvadevī, metre, 458
- Vaiśya, *p.*, 98
- Vaiśya, *varṇa*, 165, 197, 202, 203, 205, 315, 381, 382, 389, 403, 413
- Vaitāliya, metre, 458
- Vaivasvata Yama, 144
- Vājasaneyī Samhitā*, *t.*, 21
- vajra, diamond, 313
- Vajra, astrologer, 443, 452, 495
- Vajra, octagonal column, 385, 386
- Vajradatta, *k.*, 7
- Vajrakalka*, 290
- Vajrelepa, plaster, 282, 287, 290, 292
- Vajrasaṅghāta, *do.*, 392
- Vajratala, *do.*, 392
- Vakrā, Mercury's course, 440
- Vaktra, metre, 458
- vakula*, perfume, 239
- Vātāgra, measure, 327, 329, 334
- Vālava, *karaṇa*, 131

- valaya*, bracelet, 230
vallī, 278, 336
vallīja, pulses, 269
Vāmana, goat, 296-97
Vāmana, incarnation, 136, 176
Vāmanaka, elephant, 295
Vāmanaka, attendant of Bhadra, 258, 370, 371, 377
Vāmana-purāṇa, t., 45, 107, 195, 200
vaṁśa, 390, 417, 482
Vamśapatrapatita, metre, 458
Vanarājya, c., 63
Vanarāṣṭra, c., 63
vanaspati, 278
Vanaugha, forest, 63
Vanavāsī, l., 106
Vaṅga, c., 11, 98, 223, 249
Vanṇupatha Jātaka, t., 509
vāpī, 367, 377
varada, pose, 155, 193
Varāha, incarnation of Viṣṇu, 136, 137, 185, 473
Varāha, name, 16
Varāha (VM), 12, 18, 33, 351, 475
Varāhadāsa, 16
Varāhadatta, 16
Varāhadeva, 16
Varāhadinna, 16
Varāhasimha, 16
Varāhamihira, a., greatness, 1; date, 3; personal life, 12; legends and myths, 17; other known works, 19; other works attributed, 22; chronological order of known works, 24; their value for cultural history, 26; genesis of name, 469
Varāhamihira cult, 472, 474
Varāhamihirahorāśāstram, (=BJ) t., 39, 40
Varāhamihira-horā-tātparya-sāgara, commentary on BJ, 21
Varāha-purāṇa, t., 142
Vārāha Samhitā (BS), t., 18
Vārāha Samhitā, t., 469
vāraṇa-kambala, 308
Varāruci, a., 32
Varāza, 471, 472
Varāzmihr (= VM, 470)
Vardhamāna, l., 47, 106, 108
Vardhamāna, house, 387
vardhamāna, symbol, 374, 481
Vāricara, p., 98
vāricārin, aquatic animals, 295
vāriśaya, do, 295
Varṇakadaṇḍaka, metre, 405, 458
Varnas, 202-05, 245, 363
Vārtā, economics, 243, 456, 466
Varuṇa, god, 130-31, 158, 163, 171, 178, 182, 315, 319, 360, 363, 391, 404, 514
Varuṇa, territory, 45
Varuṇabhaṭṭa, commentator of *Khaṇḍa-khādyaka*, 8
Vasāketu, comet, 361
vāsanta sasya, vernal crop, 332
Vasantatilaka, metre, 458
Vasāti, p., 98
Vasiṣṭha, Dharmasāstra writer, 48
Vasiṣṭha, a., 383, 407, 425, 437, 445, 452-53, 454, 463, 489, 496, 504
Vasiṣṭha, sage, 162
Vasiṣṭha-dharmasūtra, t., 48, 246, 248, 377
Vāsiṣṭha Siddhānta, t., 431-32, 449, 452-53, 460, 465
Vāsiṣṭhīputra Pulumāvi, Sātavāhara, k., 55, 56, 80, 110, 119
Vasiṣṭha *gotra*, 204
Vaiṣṇavism, 12
Vasta-nābha, hole, 263
vāstu, 380, 412
Vāstunara, 391, 393, 414
Vāstupuruṣa, 146, 159, 390, 416
Vāstuvidyā, discipline, 380
Vāstuvidyā, t., 390, 417
Vasu, group of deities, 151, 494

- Vāsudeva, deified Vṛṣṇi, hero, 134, 135, 136, 147, 184
 Vāsuki, Nāga, 163, 321
 Vasumān, *m.*, 56
 Vasundharā, 130, 181
 Vasu Uparicara, *k.*, 70, 129, 180
 Vasuvana, forest, 63
 Vāta, house, 388
 Vāṭadhāna, *p.*, 98
 Vāṭakaṇikā, *t.*, 22
 Vātāpi, demon, 160, 163
 Vātavyādhi, *a.*, 16
 Vats, M. S., *a.*, 183, 396
 Vatsaghas, *l.*, 106-107
 Vātsa, *p.*, 98
 Vātsya, *a.*, 10, 456
 Vātsyāyana, *a.* of *Kāmasūtra*, 10, 93, 170, 210, 211, 221, 225, 237, 239, 251, 261, 312, 380, 435, 456
 Vātulantra, *t.*, 141, 459
 Vava, *karāṇa*, 127
 Vāyu, god, 146, 158, 195, 315, 319, 336, 363, 404, 417
 Vāyu-pūraṇa, *t.*, 79, 107, 108, 120
 veda (=4), 33
 Vedas, 176
 Vedāṅgas, 176
 Vedāṅga Jyotiṣa, *t.*, 431
 Vedasmṛti, *r.*, 62
 Vedavyāsa, sage, 163
 vedha, 232, 238
 Vedic gods, 127-47
 Vedic - Paurāṇic Religion, 127-37
 vegetables, 216
 Velankar, H.D., *a.*, 37, 41, 459, 467
 Vellūra, (?), *l.*, 103
 Veṇā, *r.*, 62, 313, 314, 315
 Venkatachalam, Kota, *a.*, 5
 Veṇumatī, *r.*, 62
 Venus, 161, 195, 205, 249, 311, 334, 336, 360, 361, 368, 376, 437, 449, 493, 499
 Verethraghana, deity, 472
 vetāla, 177, 200
 Vetālabhaṭṭa, *a.*, 32
 vetāliya rites, 177
 Vetravatī, *r.*, 62
 Vibhava, year, 490
 Vibhīṣaṇa, 17
 Vibhūṣaṇā, ornaments, 225
 Vibudhabhavana, shrine, 394
 vicarcikā, skin-disease, 219
 Vidarbha, *c.*, 98, 314
 Vidārī, demoness, 389
 Vidārikā *do.*, 160
 Videha, *c.*, 99
 Vidiśā, *l.*, 107
 vidradhi, disease, 219
 vidruma, 323
 Vidūratha, king, 455, 466, 478, 484
 Vidūratha, sage, 162
 Vidyādhara, demi-gods, 57, 99, 159, 404
 Vidyānkar, J. C., *a.*, 117, 121.
 Vidyaratna, Kalicharan, *a.*, 19
 Vijaya, 130, 181
 Vijaya, year 490, 492
 vijayacchanda, necklace, 227
 Vijayanandin, astronomer, 449, 453, 465
 Vijayasnāna, ceremonial ablution, 173, 242
 vijigīṣu, 479, 484
 Vijnāneśvara, commentator of *Yājñavalkya-smṛti*, 191, 250, 349
 Vikalā, Mercury's course, 440
 Vikārin, year, 490
 Vikrama, *do.*, 490
 Vikrama, a person, 17
 Vikrama era, 3, 4, 34
 Vikramāditya, *k.*, 3, 4, 19, 32, 39, 470
 Vikṛta, *year.*, 490
 Vilambin, *do.*, 490
 Vilambitagati, metre, 458
 Vilāsa, *do.*, 458
 Vilāsini, *do.*, 458

- vileśaya*, burrow-dwelling animals, 295
vimalaka, precious stone, 313, 323, 423
Vimāna, temple, 399, 400
Vimānacchanda, temple, 400, 421
Vimisra, Mercury's course, 437, 464
Vinaśana L, 48
Vinatā, 157
Vināyaka, god, 150, 190
Vināyakas, 150, 191, 404
Vinaya Piṭaka, *t.*, 262
Vindhya, *m.*, 45, 48, 49, 59, 159, 163, 226, 295, 296, 370, 479
*Vindhya*vāsin, *a.*, 29
*Vindhya*vāsinah, Vindhyan people, 47
Vipāśā, *r.*, 62
Vipulā Āryā, metre, 458
Vīramitrodaya, *t.*, 349
Virapuraśadatta, *k.*, 71
Virāṭa, *L*, 107
Virocana, 160, 405, 424
vīrudh, 278, 291, 293, 294
Viśākha, god, 150-52, 172, 191
Viśākha, *nakṣatra*, 128, 162, 359, 361, 489, 499
viśarpikā, skin-disease, 219
viśkira, animals, 295
Viṣṇu, god, 11, 12, 39, 128, 129, 130, 132, 133, 139, 160, 168, 170, 171, 172, 176, 180, 183, 184, 185, 194, 199, 226, 315, 319, 359, 375, 445, 453, 463, 490
Viṣṇucandra, astronomer, 453
Viṣṇu-dharmasūtra, *t.*, 357, 377
Viṣṇudharmottara, *t.*, 57, 84, 147, 149, 152, 155, 258, 357, 396, 401, 404, 446
Viṣṇugupta, *a.*, 455, 466
Viṣṇuism, 134-35
Viṣṇu-purāṇa, *t.*, 85, 107, 192, 193, 248
Viṣṭi, *karaṇa*, 144, 249
viṣṭi, free labour, 336
visūcikā, cholera, 220
Viśvakarman, god, 146
Viśvakarman, *a.*, 263, 327, 354, 398, 410, 420, 435, 444, 454, 466
Viśvakarma-prakāśa, *t.*, 195, 263, 344, 383, 403, 415, 454, 466
Viśvakṛt, god Brahmā, 131
Viśvarūpa, commentator of *Yājñavalkya-smṛti*, 191
Viśvarūpa, comets, 144
Viśvavasu, year, 490
Viśvedevas, gods, 157, 171
Viṭaka, *p.*, 99
Vitāna, metre, 458
Vitastā, *r.*, 62
vitasti, measure, 327, 328, 424
Vitatha, god, 391
vīthi, 376
vīthikā, 384
Viṭ-Sūdra, 205
Vivāha-pāṭala, *t.*, 10; larger and abridged versions of, 21; commented upon by Utpala, 21; composed after *YY* and before *BS*, 24-25. *Vide* also 14, 209, 303, 456, 470
vivarna, mixed castes, 205
Vivasvat, god, 391
Vivṛti, Utpala's commentary on *BJ*, 21
viyadga, 142, 143
Vogel, J. Ph., *a.*, 106, 195, 257, 421
Vokkāṇa, *L*, 99
vrana, 366, 482
vrata, 176
Vrātya dviṣa, 204, 246
Vṛddha, 187
Vṛddha-Garga, *a.*, 6, 172, 294, 360, 437, 439, 442-43, 462
Vṛddha-Śrāvaka, 141
Vṛdha-Yarana-jātaka, *t.*, 438, 462
vrkṣāyurveda, horticulture, 272
Vṛṣa, temple, 399, 401
Vṛṣa, year, 490
Vṛṣa, *rāśi*, 272, 334, 439, 462

- Vṛṣabhacarita, metre, 458
 Vṛṣadvīpa, island, 99
 Vṛṣākapi, *d.*, 473, 474
 Vṛṣali-pati, 248
 Vṛścika, *rāśi*, 272, 334, 439, 462
 Vṛṣṭiprayāta-daṇḍaka, metre, 458
 Vṛṣya, erotic remedies, 244
 Vṛtrahan, god Indra, 127, 472
 Vṛtta, circular column, 385
 Vṛtta, temple, 399, 407
 Vyāghramukha, *p.*, 51, 99
 Vyālagriva, *p.*, 51, 99
 Vyās, Pandit Suryanarayana, *a.*, 13
 Vyāsa, *a.*, 261, 456
 Vyatipāta, *karaṇa*, 249
 Vyaya, year, 490
 vyomacārīn, animals, 294
 vyūhas, 135

 water, recipe for clearing, 512
 water-veins, means of ascertaining, 510-11
 Watters, T., *a.*, 38, 124, 189, 345, 353
 weapons, 482-83
 Weber, A., *a.*, 36, 445, 448, 462, 463, 464
 wedded life, 209-11
 weights, 324-25
 wells, situation of, 511
 Whitney, W.D. *a.*, 445, 451, 462
 widow remarriage, 211
 wild animals, 295-96
 Wilson, H. H., *a.*, 71, 85, 115
 wine, 216-17
 Winternitz, M., *a.*, 32, 35, 37
 women, position of, 207-12; signs of, 367-68
 wood-carving, 303
 Wright, H.N. *a.*, 103

 Yājñavalkya, Dharmaśāstra writer, 181, 246
 Yājñavalkya-smṛti, *t.*, 129, 150, 181, 190, 222, 247, 250, 349, 357, 377, 423
 Yājñavarāha, *d.*, 474

 Yajñopavīta, sacrament, 169
 Yajurveda, *t.*, 169
 Yakṣas, demi-gods, 145, 146, 149, 158, 159, 160, 172, 189, 195, 304
 Yama, god, 144-45, 158, 189, 315, 319, 336, 360, 391, 404
 Yāmasūrya, house, 388
 Yāmunā, *r.*, 49, 57, 62, 478
 Yāmuna, *p.*, 60, 62
 Yāmyodadhi, Indian Ocean, 63
 yantra-mukta, missiles, 482
 Yaśastilakaeamkū, *t.*, 484
 Yāska, *a.*, 62, 77, 271, 334
 Yaśodhara, commentator of *Kāmasūtra*, 93, 312, 380
 Yaśovatī, *l.*, 107
 yaṣṭi, necklace, 229
 Yātrā, class of works, 15, 24-25, 197, 433, 438, 441, 454, 461; contents of, 433
 Yātudhāna, 159
 Yaudheya, *p.*, 84, 99-100; king of, 477
 yava, measure, 327, 328, 354
 yavāgū, 215
 yāvaka, 215
 yavaka, rice, 212, 270
 Yavakṛita, sage, 162
 Yavana, *p.*, 45, 100, 119, 206-07, 437-38, 445, 447, 453, 461, 463
 Yavana, *a.*, 438
 Yavana-jātaka, *t.*, 438
 Yavanapura, *l.*, 5, 448, 449, 451
 Yavanas, *a.*, 455
 yāyin, 479
 Yazdani, G., *a.*, 256, 257, 258
 Yogānta, Mercury's course, 437, 464
 Yogārṇava, *t.*, 23
 Yogayātrā, *t.*, edited by H. Kern, J. L. Shastri and V. R. Pandit and commented by Utpala, 21; composed after *BY* and before *VP*, 24-25. *Vide* also 13, 158, 166, 173, 175, 197, 273, 450

- yojana*, measure, 328, 355, 432, 452, 504
 Yuan Chwang, Chinese pilgrim, 13, 68, 69, 75, 76, 77, 80, 93, 95, 101, 105, 116, 117, 118, 121, 141, 142, 144, 187, 205, 246, 248, 261, 270, 302, 307, 309, 311, 314, 319, 350
 Yudhiṣṭhira era, 3, 6, 15, 34, 37
Yuga, lunar appearance, 359
yuga, yoke, 307
yuga, quinquennium, 447, 448, 464, 491
Yugandhara, c., 100
yūkā, measure, 327, 328
Yuktikalpataru, t., 231, 265
 Yule, a., 88
Yuvā, year, 490
yuvārāja, crown-prince, 256, 363, 380, 480, 485
 Zoroastrianism, 2, 143, 470, 471

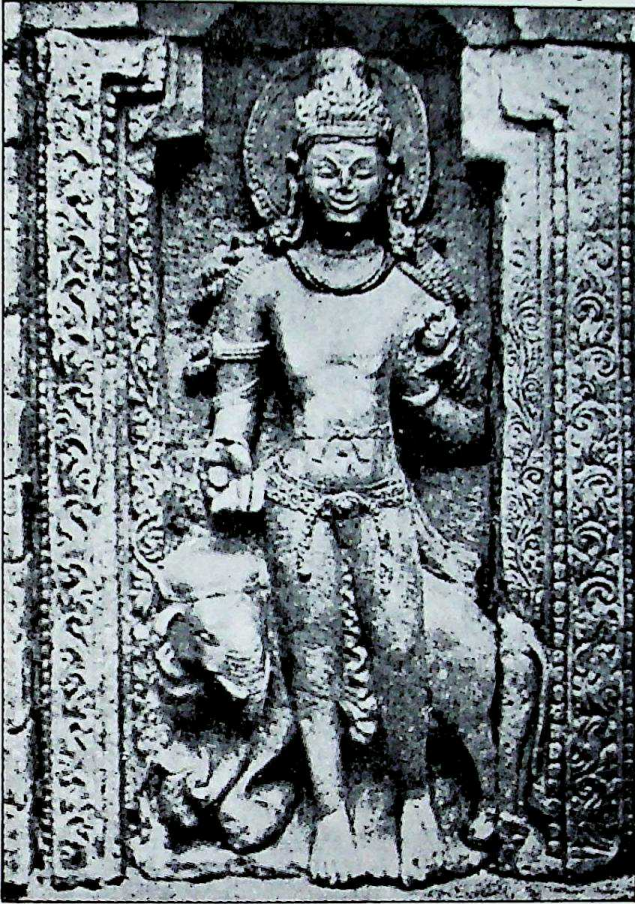


Fig 1. Indra, Paharpur.



Fig 2. Varuna, Harihara Temple,
no. 1., Osian, Rajasthan.

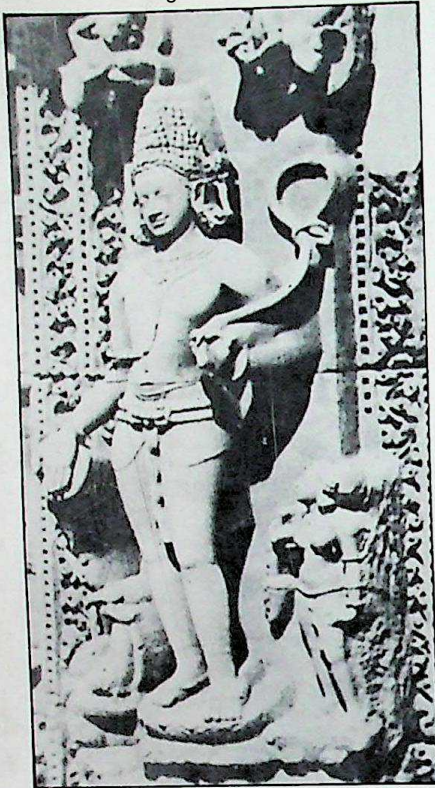


Fig 3. Varuṇa, Rajarani Temple, Bhuvaneshwar.



Fig 4. Brahma, Mandhal, Nagpur District.

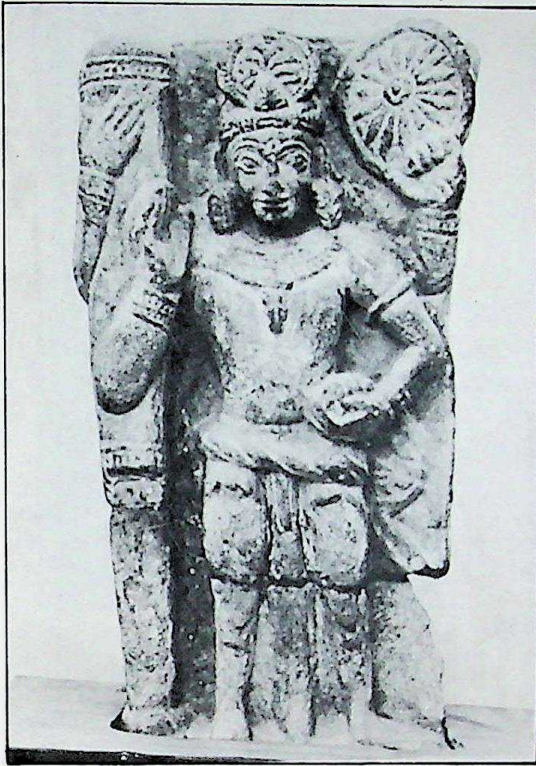


Fig 5. Viṣṇu, Mathura.





Fig 7. Sūrya, Mathura.



Fig 8. Sūrya, Kayatha.

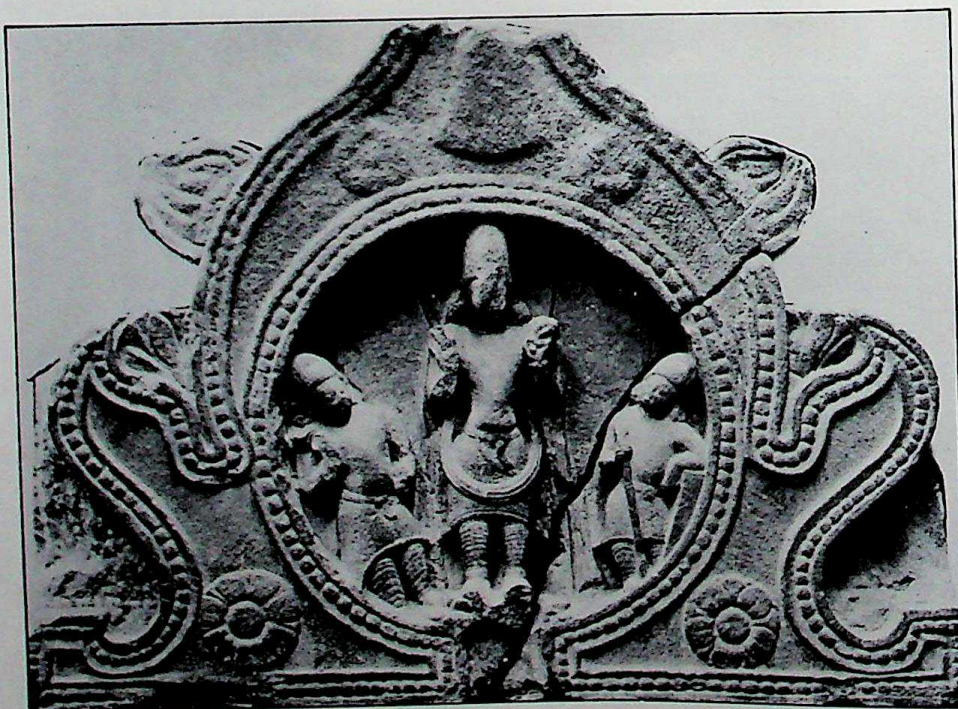


Fig 9. Sūrya, Bhumara.

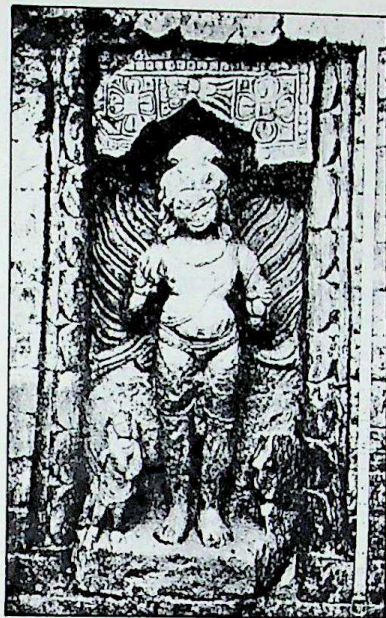


Fig 10. Agni, Paharpur.



Fig 11. Yama, Harihara
no. 2, Osian.



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Fig 12. Yama, Brahmesvara Temple, Bhuvaneshwar.

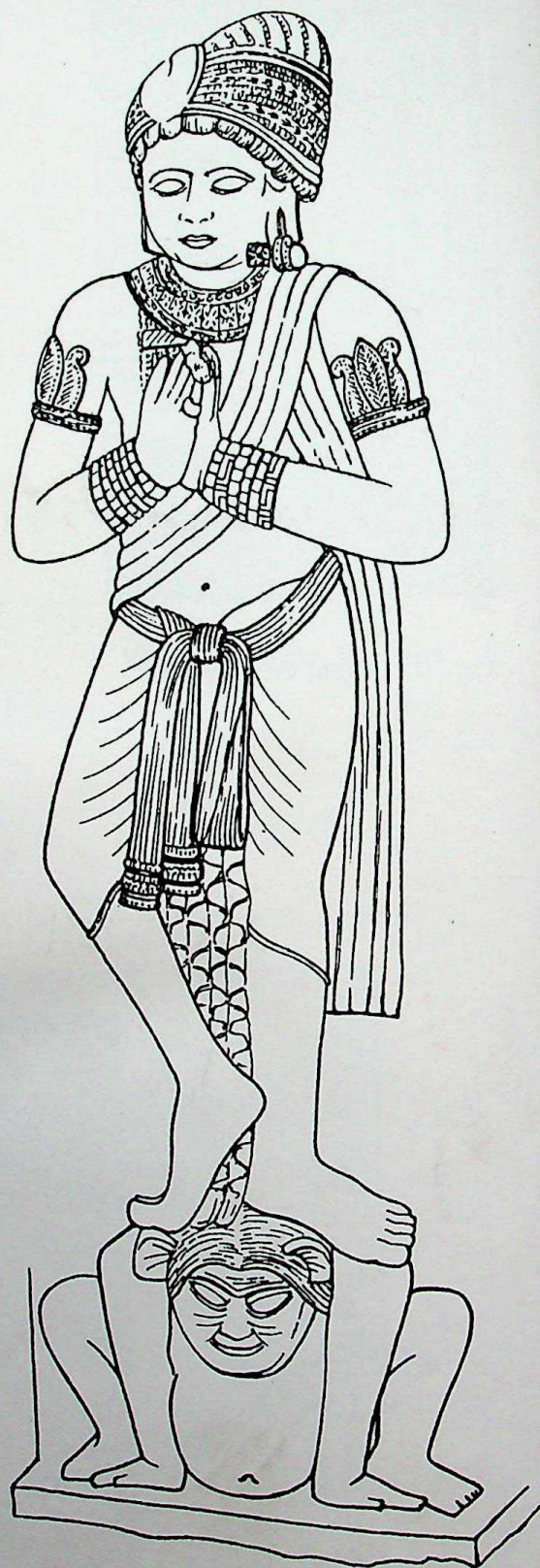
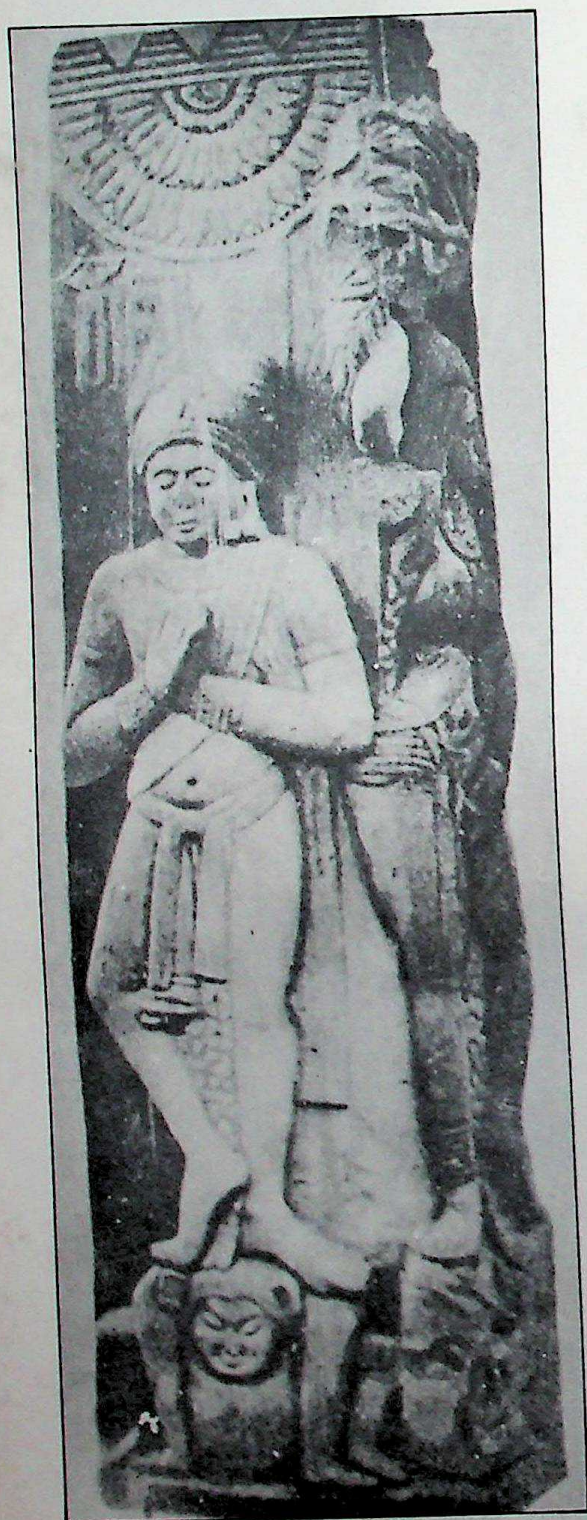


Fig 13. Kubera, Bharhut. (Photo and Line-Drawing)



Fig 14 Kubera, Harihara
Temple, no. 2, Osian.



Fig 15. Baladeva, State
Museum, Lucknow.



Fig 16. Baladeva, Paharpur.

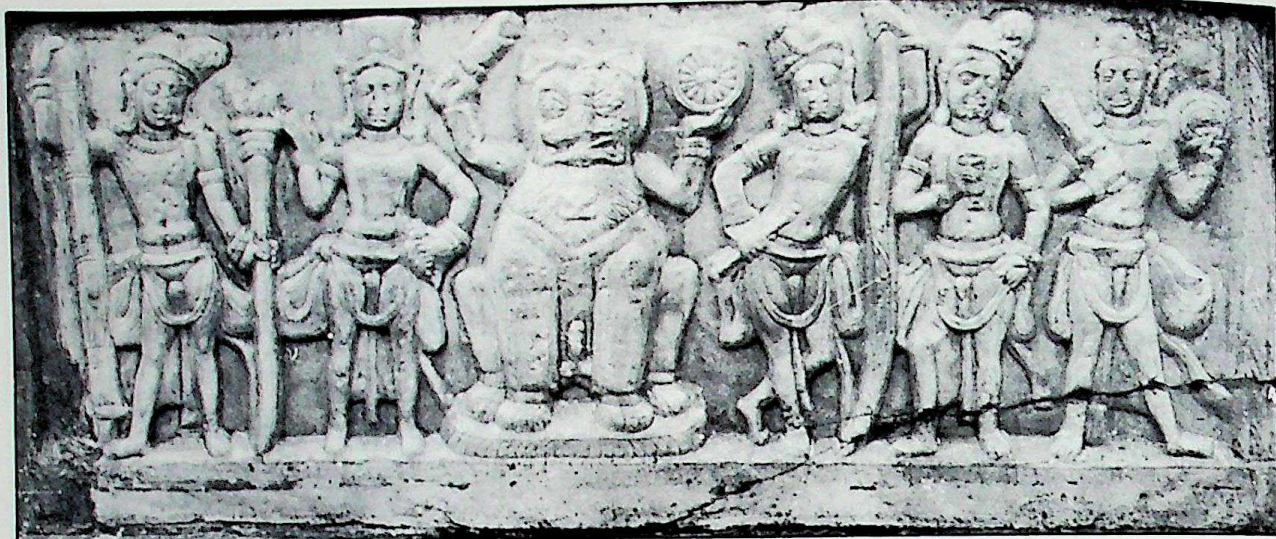


Fig 17. Pañcavīra Panel, Kondamottu.



Fig 18. Skanda Bhairava Kala Bhavani, Varanasi.



Fig 19. Revanta, Patna Museum.



Fig 20. Revanta, Pachar, Gaya District.

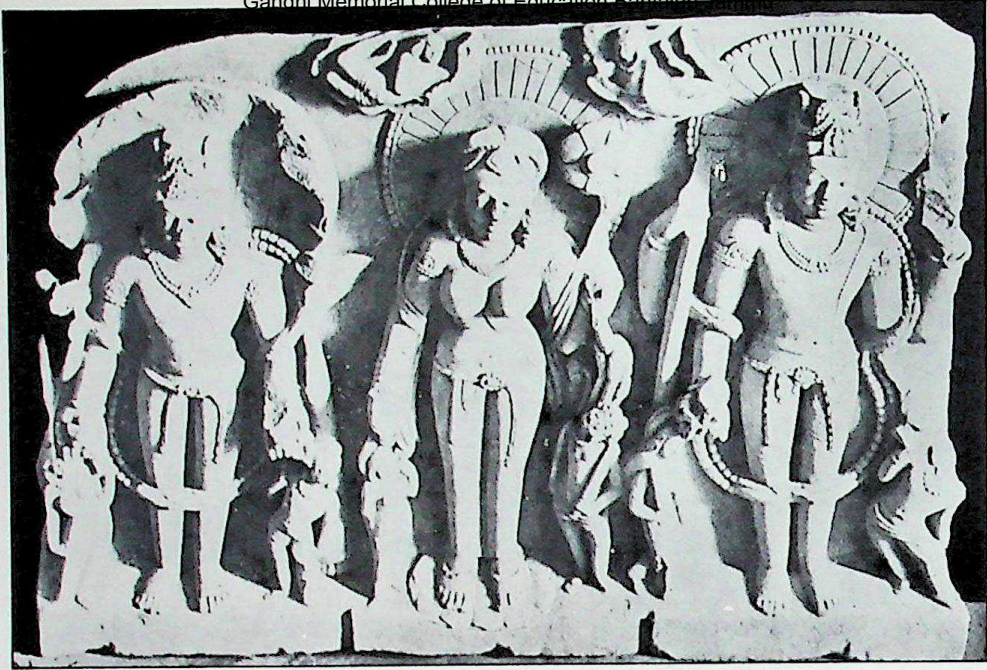


Fig 21. Ekānamśā, State Museum, Lucknow.

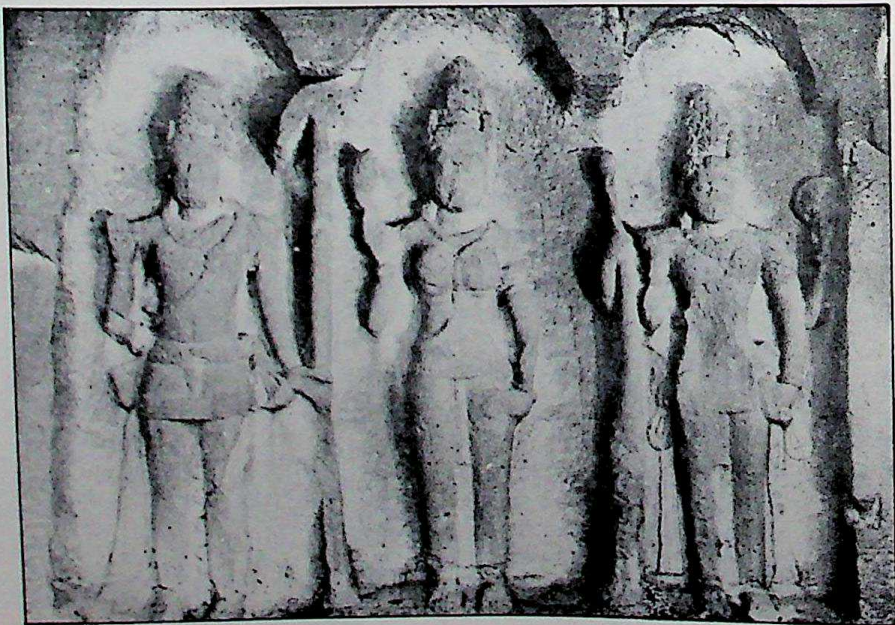


Fig 22. Ekānamśā, Ellora.



Fig 23. Pārvati, Mandhal, Nagpur.

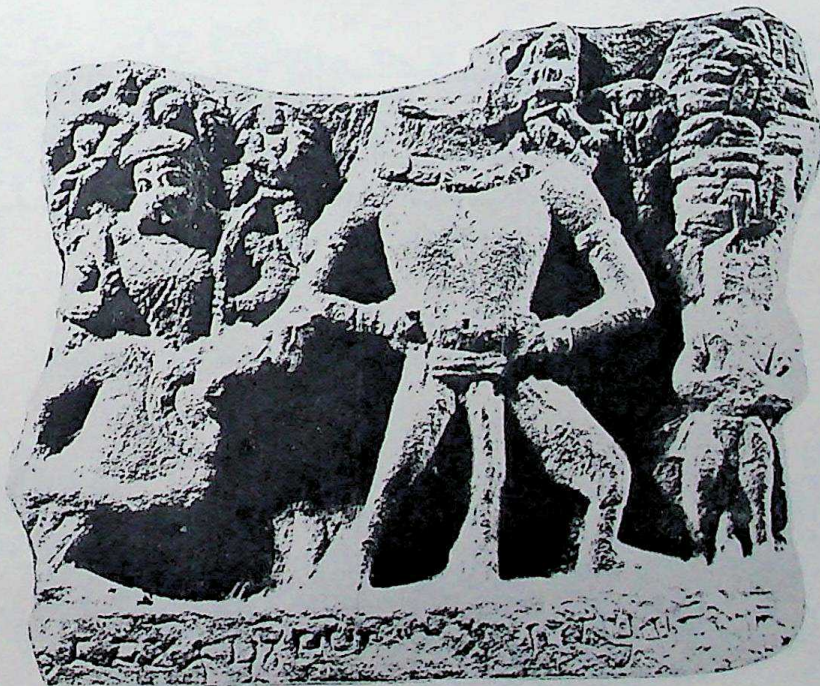


Fig 24. Varaha holding Sun and Moon, Mathura Museum .



Fig 25. Varāha, Bazaklik, Central Asia.



Fig 26. Male figure wearing *ekāvali* and *hārāphalaka*, Ajanta.

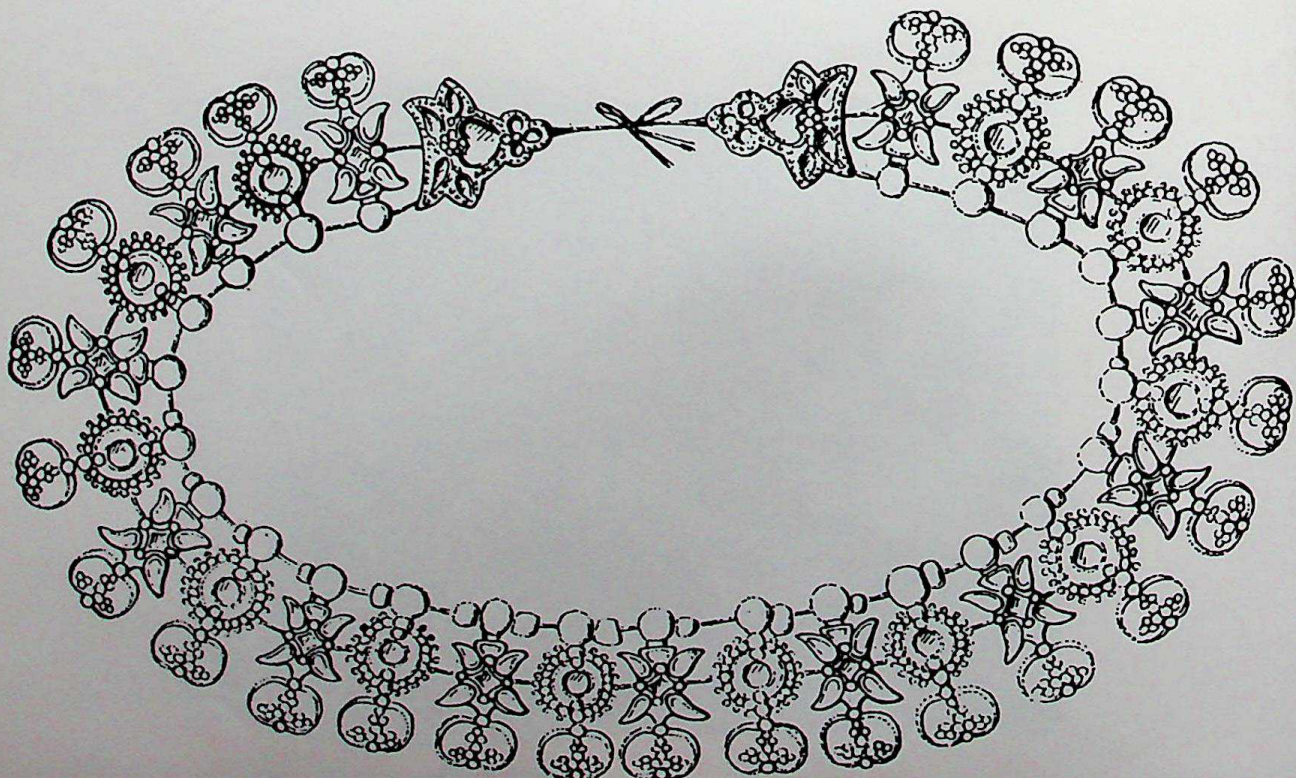
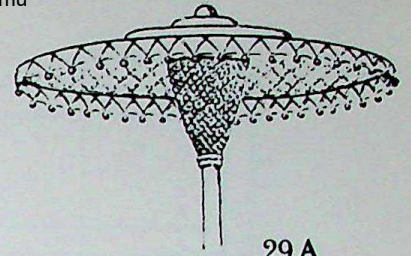


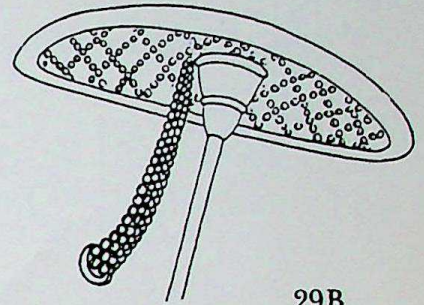
Fig 27. *Naksatramālā* (of gold), Taxila.



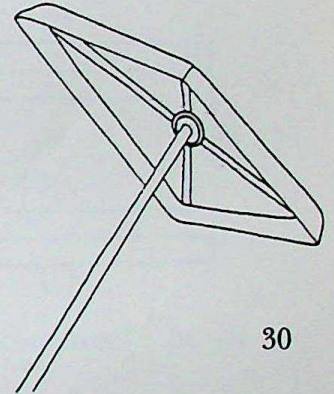
28



29 A



29B



30

Fig 28. Bodhisattva Padmapāṇi wearing *yaṣṭi* Ajanta.

Fig 29(A&B) Royal Umbrellas, Ajanta.

Fig 30. Square umbrella, Ajanta.

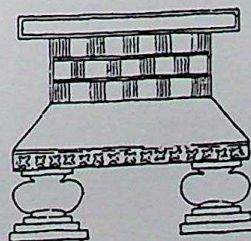
Fig 31. Lady holding a circular mirror, Ajanta.

Fig 32. Seat with *kumbha* legs, Amaravati.

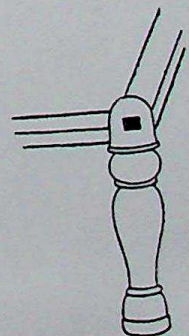
Fig 33. Parts of the leg of a couch, Kaṣāna Art.



31



32



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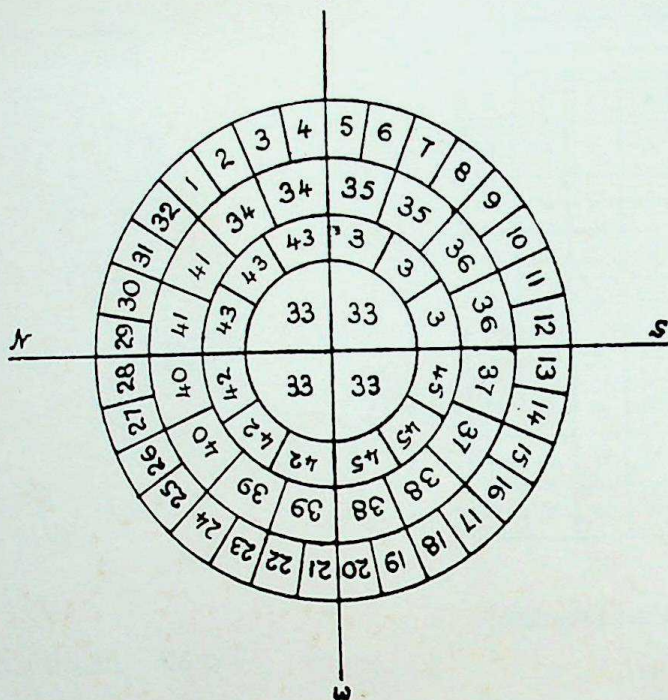
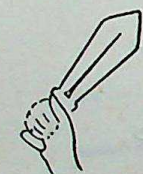


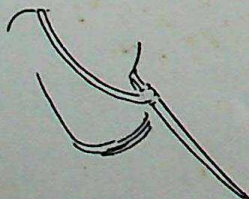
Fig 43. *Catuḥṣaṣṭipada* plan (circular).



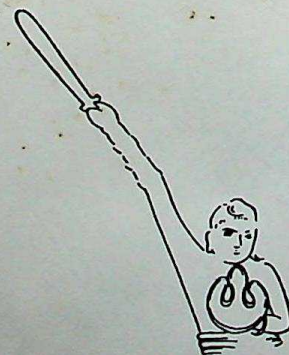
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47

SWORDS

Fig 44. Lotus-petal-shaped, Amaravati.

Fig 45. Bamboo-leaf-shaped, Amaravati.

Fig 46. Pointed (*sūlāgra*), Nagarjunakonda.

Fig 47. Rounded (*mandāgra*), Amaravati.

Ajay Mitra Shastri (b. 1934), a reputed historian, epigraphist, numismatist and indologist, has just retired as Professor of Ancient Indian History, Culture and Archaeology from Nagpur University. A former Editor of the *Journal of the Numismatic Society of India* and the *Journal of the Epigraphical Society of India* and Chief Editor of the *Nidhi* (Journal of the Indian Coin Society), he is currently Chief Editor of the *Numismatic Studies* and Editor of the *Numismatic Digest*. Formerly Chairman of the Indian Coin Society, he is now Vice-Chairman of the Epigraphical Society of India and of the South Indian Numismatic Society, Convener of the Inscriptions of India Programme of the Indian Council of Historical Research, New Delhi, and Chairman of the Advisory Board for History of Science (Ancient Period) of the Indian National Science Academy, New Delhi.

Professor Shastri has been Sectional President of the Indian History Congress (1978), Andhra Pradesh History Congress (1981), Maharashtra Itihas Parishad (1986) and the All-India Oriental Conference (1994) and General President of the Numismatic Society of India (1981), Epigraphical Society of India (1987), third International Colloquium on 'Coinage, Trade and Economy' at the Indian Institute of Research in Numismatic Studies, Nasik, Tamil Nadu Numismatic Society, Indian History and Culture Society (1991) and the Vidvat Parishad of the Bharatiya Itihas Sankalan Samiti (1994), Member of the History panel of the University Grants Commission (1980-82), UGC National Lecturer (1985) and UGC National Fellow (1987-89) and is currently UGC Emeritus Fellow. He has been felicitated by the Numismatic Society of India with its Akbar Silver Medal (1984) and Altekar Gold Medal (1995); presented with a plaque of honour by the Coin Study Circle, Calcutta (1989), and a copper-plate by the Epigraphical Society of India (1992) and honoured with a couple of festschrifts: one published from Indore (1988) and the other in two tomes from Delhi (1989). He has also delivered numerous prestigious endowment lectures.



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